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THE LARGE EARTHQUAKES
OF
1913.

EPICENTRES, DATES AND TIMES, AND RESIDUALS FOR P. AND S.

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Seismology Committee.

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THE LARGE EARTHQUAKES OF 1913.

INTRODUCTION

— BY —

PROFESSOR H. H. TURNER, F.R.S.

Up till the time of John Milne's death there were regularly issued from his Observatory at Shide—

(*a*) The Shide circulars, giving the information received from the numerous Stations organized by Milne. These results were left under the heading of the Station, but a preliminary collation of all the lists was made at Shide in a large book, in order that readings due to local tremors or mistakes should be cut out, the test being that a quake should be recorded at several stations.

(*b*) The annual reports, in which, among information relating to various matters, lists were given of the chief earthquakes with determinations of epicentre and time at origin. In obtaining these epicentres use was made of records at stations outside the Milne organization, but no details were printed.

After Milne's death, I took charge (as Chairman of the British Association Committee, to which he had regularly reported, and of which he had long been Secretary and the chiefly active member) of the work at Shide. I was fortunate in being able to retain the help of Mr. J. H. Burgess and Mr. S. W. Pring, who had been assisting Milne in recent years. After consulting them I decided to change the form of the Circulars, arranging the information under Earthquakes instead of under Stations; and it seemed natural to include all the information to hand regarding a particular earthquake, whether from Milne stations or others. The change was made with January, 1913. At first all earthquakes were included; but in April, 1913, the details were restricted to the larger quakes. For others there was published merely a chart shewing the number of stations which had recorded each quake, nothing further being added unless details from at least 31 stations were available. When the 1913 results had been published in this way and arrears had been caught up a little, it was found practicable to make the advance of determining the epicentres and times; and forming the residuals for P and S for each station. From January, 1914, the information

has accordingly been given in this form. The tables used have been printed on the back of each bulletin, and are repeated at the end of the present pamphlet. In the earlier months of 1914 the epicentres were adopted from Pulkovo; but it gradually became clear that these determinations could be improved by a study of the general mass of material, and later determinations were made at Shide in this way.

With the advent of War, there was naturally a great falling off in the quantity of material received. At first not only the German, but the Russian information failed; but after several attempts communications were reopened with the Russian stations, and their records have been fully and regularly received. Nevertheless, the epicentre determinations have proved much more doubtful and difficult, and it becomes clear that 1913 and 1914 will represent the high-water mark of our available information for some years to come. The records for 1915 have been collated, and those for Jan. and Feb.-Mar. have been published in two bulletins. The others will follow shortly. Their issue has been deliberately delayed in order to make sure of getting all available information, and records for several months will be collated into one circular to save expense of distribution. The discussion of the 1916 results is proceeding.

Meanwhile it seemed very desirable to reduce the 1913 results to the same shape as those of 1914, and the present pamphlet has therefore been prepared. It has been shewn in the last two reports to the British Association that sensible corrections are required to the tables for P and S; but to facilitate discussion the tables have been retained, excepting only that in determining epicentres some use has been made of our approximate knowledge of the corrections required.

It was, however, natural to make a preliminary examination of the 1913 material, in order to see whether the corrections indicated by the 1914 results were supported. It was shewn in Table XXI. of the last report to the British Association (21st report) that the times for S and P were in the ratio 1·800, within limits of error so small that it is very doubtful whether observations hitherto recorded can assign any departure. If we adopt this constant ratio for use, it becomes unnecessary to study S and P separately; we can confine attention to either alone, or to their difference S—P. The great advantage of limiting attention to S—P is that erroneous time-determinations at various stations are eliminated; and accordingly, in the first instance, only those records in 1913 were considered in which both S and P were observed, so that S—P can be formed. The preliminary results are collected in Table I., the corresponding figures for 1914 being taken from Table XVII. of the 21st report for comparison. The figures now given for 1913 are the *medians* of all residuals which are not probably mistakes; they are subjected to scrutiny and revision in the paragraphs which follow.

Table I.

Provisional Corrections to adopted S—P from observations in 1913 (*and* 1914).

Δ	1913	1914	Δ	1913	1914	Δ	1913	1914
° °	s	s	° °	s	s	° °		
0—10	+4	+ 5	40—45	− 5	−10	75— 80	− 9	− 2
10—15	+4	+11	45—50	− 9	− 7	80— 85	− 7	− 6
15—20	+2	+ 4	50—55	− 8	− 6	85— 90	−15	−14
20—25	+2	− 1	55—60	− 7	+ 2	90— 95	−33	−33
25—30	−1	+ 1	60—65	−10	− 2	95—100	−56	−52
30—35	−5	−14	65—70	− 7	− 2	100—105	−72	
35—40	−7	− 8	70—75	− 4	+ 7			

The important questions arise in connection with small and great distances from epicentre. Let us consider the large values of Δ first.

Values of Δ *from* 80°·1 *to* 85°·0.

In the first instance the following residuals were rejected as either simple mistakes or involving records of some phenomenon other than P or S :—

On the positive side

s.	s.	s.	s.	s.	s.	s.	s.
+154	+146	+106	+68	+49	+46	+45	+43.

On the negative side

s.	s.	s.	s.	s.	s.
−123	−116	−89	−57	−50	−47.

The median of the remainder is −7s., and would not be altered if all the above excluded residuals were included. The distribution of retained residuals is shown below, including under zero all those from −5s. to −9s. inclusive : under +5s. those from 0 to −4s.: under −5s. those from −10s. to −14s.: and so on. The upper line gives positive residuals

s.	s.	s.	s.	s.	s.	s.	s.
0	± 5	±10	±15	±20	±25	±30	±35
16	23	19	4	7	3	0	2
	21	21	8	1	2	1	0

Now the striking feature of this distribution is the smallness of the group zero. It is sensibly less than any of the neighbouring four groups, which suggests that two sets of phenomena are possibly confused, one with median say at 0s. and the other at −14s. We must examine whether the residuals for other values of Δ support this view. In addition, there are curious features among the excluded residuals to which more attention must ultimately be paid.

Values of Δ *from* 85°·1 to 90°·0.

The following were excluded in the first instance:

On the positive side

s.	s.	s.	s.	s.	s.	s.
+312	+282	+152	+121	+52	+44	+19

On the negative side

s.	s.	s.	s.	s.	s.	s.
−151	−147	−121	−93	−89	−83	−77

The median of the remainder is −15s., which would not be altered if the above were included. They are distributed as follows:

	s.	s.	s.	s.	s.	s.	s.
	0	±5	±10	±15	±20	±25	±30
15		17	10	4	3	2	0
		8	12	6	5	0	1

This distribution is not inconsistent with the existence of a dual maximum, but does not independently suggest it.

Values of Δ *from* 90°·1 to 95°·0.

The following were excluded in the first instance:

On the positive side

s.	s.	s.	s.	s.	s.	s.
+418	+136	+100	+99	+80	+43	+32

Also the following set, which seems to relate to some other phenomenon

s.	s.	s.	s.	s.	s.	s.	s.	s.	s.		s.
+7	+6	+2	−1	−2	−2	−5	−8	−9	−9.	Median	−2

There are corresponding outlying sets of residuals for subsequent values of Δ: and we shall provisionally call this "first set." The main set of residuals to be given in a moment will be called "second set." But to complete the statement of excluded residuals those on the negative side are

s.	s.	s.
−337	−255	−166

Also the set

s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
−92	−77	−75	−73	−73	−73	−68	−64	−60	−59	−58	−56	−55	−52

the median of which is −66s. This will be called "third set."

Of the main or "second set" the median is now −30s., and the distribution is as follows:

	s.	s.	s.	s.	s.
	0	±5	±10	±15	±20
7		8	5	1	?
		6	7	6	?

In the groups for ±20s. the residuals of the first and third sets begin to enter: so that the whole distribution is subject to some uncertainty. If we disallow the separation into three sets, the

median of all the residuals is altered to —33s. If we allow the separation of the first set, but not the third, it becomes —39s.: if we allow the third, but not the first, it becomes —28s. But the hypothesis of three sets is reasonable: the three medians —2s., —30s., and —66s. are well separated: and on reference to the previous groups of Δ it will be seen how improbable it is that there should be a set of 10 actual residuals grouped at a distance of +28s. from the median (as in the first set), and still more that there should be a set of 14 grouped at a distance of —36s. from the median, as in the third set. Moreover, we have not only had indications of a composite phenomenon already, but shall find more in the groups which follow.

Values of Δ *from* 95°·1 to 100°·0.

The following were excluded:

On the positive side +96s., +54s., and +35s.

Also the "first set" —2s., —2s., —3s., —4s., —15s., —16s., —17s., —18s., —18s., —21s., —23s., —28s., and —30s. Median —17s.

On the negative side —315s.

Also the "third set" —138s., —122s., —113s., —94s., —87s., —83s., —82s. Median, say —100s.

The "second set" in between these has median —59s., round which it is distributed thus

s.	s.	s.	s.	s.	s.
0	±5	±10	±15	±20	±25
5	7	3	4	4	1
	8	5	3	3	?

The separation is tentative and uncertain, but may suffice for a provisional examination.

Values of Δ *from* 100°·1 to 105°·0.

The following were excluded:

On the positive side +83s., +66s., +44s., +15s.

Also the "first set" —4s., —7s., —9s., —10s., —19s., —22s. Median —10s.

On the negative side —367s., —358s., —346s., —311s., —302s.

Also a little possible set —241s., —205s., —191s., —174s.

And a pair which may possibly represent the "third set" —143s., —129s.

The median of the remaining 32 is —74s. or —75s.: call it —75s. The distribution is then as below

s.	s.	s.	s.	s.	s.	s.	s.
0	±5	±10	±15	±20	±25	±30	±35
6	4	3	2	1	1	2	0
	2	1	4	0	3	1	2

Values of Δ *from* 105°·1 to 110°·0.

There were excluded on the positive side only +427s. and +147s.

The "first set" is +31s., +7s., +1s., +1s., −19s., −23s., −33s. Median +1s.

The "second set" now becomes very weak, and we may write out the whole of it, viz.:

s.	s.	s.	s.	s.	s.	s.
−66	−83	−94	−106	−106	−110.	Median say −100.

On the negative side we have a "third set" (?) −156s., −178s., −195s., and again two large residuals −276s. and −375s.

Values of Δ *from* 110°1· to 115°·0.

Excluded definitely +210s., +115s., +90s., +83s., +50s.

"First set" +7s., +2s., −2s., −3s., −4s., −21s. Median −3s.

The "second set" becomes very doubtful indeed and has practically disappeared. We only have −64s. and −118s. as possibilities.

Finally there is a large residual −295s.

Values of Δ *from* 115°·1 to 120°·0.

Excluded +89s.

"First set"? −12s. and −19s.

Second set: None; *it has quite disappeared.*

Third set −185s. and −207s.

Excluded −274s. and −280s.

Values of Δ *from* 120°·1 to 130°·0.

Positive mistakes, none.

First set? +1s., −20s., −25s., −26s. Median −22s.?

The second set now apparently *reappears* as follows:

s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
−67	−76	−80	−80	−83	−90	−90	−98	−98	−107	−108	−120	−120	−128

The median of these is −94s.

And now we have also the following numerous residuals for the "third set"

s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
−152	−168	−171	−189	−200	−203	−203	−204	−213	−218	−221

The median is −203.

There is also a

	s.	s.	s.	s.	s.	s.	s.	s.	s.
Fourth set	−257	−260	−273	−279	−288	−288	−292	−293	−311

Median, say —288s. We can now recognise members of this set in previous groups ; and it may here be stated that the general breaking up in previous paragraphs was only suggested after these later groups had been studied. In the first instance the residuals were treated as referring to a single phenomenon ; it was only in revision that the composite nature was recognised.

We also have a

	s.	s.	s.	s.	s.	s.	s.	s.
Fifth set	—320	—320	—328	—337	—341	—347	—367	—386

median, say —344s.: of this again members can be recognised in earlier groups. One large residual of —476s. is unclassified.

Values of Δ *from* 130°·1 to 140°·0.

Mistakes +216s., +124s., +44s.
First set —21s.
Second set —56s., —80s., —81s., —93s., —115s.
Third set —158s., —164s.
Mistakes —469s., —581s., —655s., —670s.

Values of Δ *from* 140°·1 to 150°·0.

Mistakes +262s., +122s., +92s.
First set —32s.
Second set —119s., —127s., —141s., —170s.
Third set ? —186s., —201s., —215s.
Mistakes —750s., —796s.

We may now summarize these results as in Table II.

TABLE II.

Summary of Apparent Alternatives for S—P.

Δ =	82°·5	87°·5	92°·5	97°·5	102°·5	107°·5	112°·5	117°·5	125°·0	140°·0
			s.	s.	s.	s.	s.	s.	s.	s.
First set	—	—	— 2	— 17	— 10	+ 1	— 3	— 16	— 22	— 27
No. Obs.	—	—	10	13	6	7	6	2	4	2
Second Set	—7	— 15	— 30	— 59	— 75	—100	—118?	—	— 94	—100?
No. Obs.	126	83	40	43	32	6	1?	0	14	8
Third Set	?	?	—66	—100	—136	—180	—	—196	—203	—170?
No. Obs.			14	7	2	3	—	2	11	3
Fourth Set	?	—93	—166?	—	—196	—276?	—295?	—277	—288	
No. Obs.		7	1	—	4	1	1	2	9	
Fifth Set			—337?	—315	—340	—375?			—344	
No. Obs.			1	1	5	7			8	

Now it is possible that the true S—P is represented by the "first set," which is not far from the present Tables, and may run into the "second set" near 90°. But the much larger number of observations in the second set so far as $\Delta=105°$ suggests that these are the normal readings. We have, however, to explain the disappearance of this set after $\Delta=110°$. Let us first form, with the corrections found in the "second set," the new values for S—P, as follows :

TABLE III.

S—P				S—P			
Δ	Tables	Corrn.	New Value	Δ	Tables	Corrn.	New Value
°	s.	s.	s.	°	s.	s.	s.
82·5	618	− 7	611	102·5	717	− 75	642
87·5	644	−15	629	107·5	739	−100	639
92·5	670	−30	640	112·5	761	−118	643
97·5	694	−59	635	117·5	778	?	

It will be seen that the new values shew a startling tendency to become *constant* after 90°. They are obviously affected by accidental errors, which may be reduced by "smoothing" and by taking in the 1914 observations to help. The following figures are the results of taking the mean of two adjacent 1913 corrections and two corresponding 1914 corrections :

Δ=	80°	85°	90°	95°	100°	105°
S—P=	598 s.	621 s.	634 s.	636 s.	639 s.	641 s.

Let us consider what it would mean if the values of S—P became actually *constant*, assuming that P and S are affected in the same way. The "angle of emergence" for P depends on $\delta P/\delta\Delta$, and if this becomes zero, the angle of emergence is 90°. Now, if we may assume a path within the earth which is symmetrical with respect to the two ends, the angle along which P *starts* must also be in that case 90°, *i.e.*, the waves will start towards the ant-epicentre, or very nearly. There is no need to strain the facts by making the angle of emergence exactly 90° : the figures shew that after reaching $\Delta=85°$ the angle of emergence must rapidly approach 90°, carrying with it the angle at the other end of the path. Hence to feed the whole of the hemisphere away from the epicentre we only have the small bundle of P rays, which starts nearly at right angles to the surface. With this conception in our minds we can well understand why the simple P and S waves become so difficult to observe for $\Delta>90°$. The practical disappearance of S—P, *i.e.*, of the "second set" in Table II. for $\Delta=112°{\cdot}5$ and $\Delta=117°{\cdot}5$ is easily explained.

But what of the reappearance for $\Delta = 125°{\cdot}0$ and $\Delta = 140°{\cdot}0$? It must be first examined whether these figures really refer to the same phenomenon as before. The discussion has hitherto simply taken account of S—P, for reasons stated at the outset, the chief of which is that errors of time determination at the stations are thereby eliminated. But if now we go back to the separate errors for P and S, from which S—P was formed, and make a new analysis, excluding certain obvious mistakes, we find that the mean results are quite plainly as follows:

No. Obsns.	Mean Δ	Error of P	Error of S	Error of S—P
	°	s.	s.	s.
12	107·5	− 10	−110	−100
5	122·5	+203	+ 89	−114
4	125·4	+194	+ 97	− 97
4	129·7	+170	+ 91	− 79

There are some regular phenomena after 120°, but they are not (according to the views here advocated) the regular P and S. For one thing the ratio of the times of transmission after 120° is quite different from 1·800. Applying the above errors to the adopted Tables, we get at (say) $\Delta = 125°$

	s.		s.		s.
Time for P =	966	(Tables)	+195	(Correction) =	1161
,, S =	1766	,,	+ 97	,, =	1863

The ratio is 1·605. A second point is the jump from −10s. at $\Delta = 107°{\cdot}5$ to about +200sec. at $\Delta = 120°$ in the P residuals, with a nearly similar jump in S. This jump has long been known and has been ascribed to discontinuities in the earth's interior. The views taken in the 21st Report outline a different hypothesis, viz., that the records for P and S are really those for waves anomalously reflected near the epicentre. These phenomena depend for their explanation upon the corrections to the Tables near the epicentre, and we must now see how far the 1913 observations confirm those of 1914 in this respect.

Reasons were given in the last Report for suspecting that $\delta P/\delta\Delta$ and $\delta S/\delta\Delta$ do not drop in value continuously as indicated by the adopted Tables, but undergo several changes: rising in value at first, up to a maximum at (say) $\Delta = 10°$, then suddenly falling rapidly to a minimum; then rising again to a second maximum, and finally falling steadily to zero. If these changes exist, they can only be traced from a very exact knowledge of the times for P and S between $\Delta = 0°$ and $\Delta = 40°$. Now the results for 1913 (see Table I.) confirm those of 1914 in shewing a positive correction to S—P at $\Delta = 13°$, and a negative correction at 33°, but the numerical amounts are much smaller in 1913: and although only a few seconds are concerned, the difference between the two years may be serious. We must scrutinize such material as there is very closely.

Before dealing with the 1913 results, we may recall rather more precisely the main conclusion of the 1914 results, as discussed in the concluding paragraphs of the 21st Report. There must be *abrupt peaks* in the graphs for P, S, and S—P (or rather the graphs of the *corrections* to the present smooth curve) near $\Delta=13°$, so that $\delta P/\delta\Delta$ and $\delta S/\delta\Delta$ have high values just before $\Delta=13°$ and low values just after. To detect this the grouping in 5° of Δ, as in Table I., may not suffice, and it will be better to exhibit the residuals in greater detail as in Table III. Each heading such as 8° covers Δ from 8°·0 to 8°·9. All residuals are shewn, but some, shewn in brackets, are not used in forming means.

TABLE III.

Corrections to S—P near Epicentre for 1913.

Δ=	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°
	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
	+10	+30	+34	(+194)	+31	(+128)	+14	+44	+14	− 6	+ 8	+11
	+ 5	+14	+17	+ 35	+17	(+ 64)	+14	+21	+ 7	−14	+ 8	+ 8
	+ 4	+ 4	−23	+ 8	+16	(+ 63)	+ 4	−19	+ 4	−33	+ 4	+ 7
	+ 1	− 3	(−88)	− 13	+13	+ 25	− 1	−40	+ 1		+ 2	+ 2
	−16	− 3		− 16	0	+ 24	− 3		− 1		− 1	0
	−28	−42		− 31	− 6	+ 14	−10		− 9		− 4	− 2
		(−64)			− 9	+ 12	−18				−13	− 4
						+ 7	−19					− 5
						+ 4	−19					−16
						+ 3						
						+ 2						
Mean	− 6	0	+ 9	− 3	+ 9	+ 11	− 4	+ 1	+ 3	−18	0	0
			−1			+10			−2			

Now, without laying undue stress on these few results, which are clearly affected by considerable accidental errors, it may fairly be claimed as noteworthy that they shew a sharp positive peak just in the place ($\Delta=13°$) mentioned at the end of the 21st Report. The analysis of the 1914 results was not carried out to single degrees of Δ (though this will now be done), so that the exact locality of the peak was inferred rather than determined: but the inference was apparently not far wrong. There is not a single negative residual under $\Delta=13°$, even the mistakes being on the positive side. There is some doubt what to exclude as mistakes, but it would be difficult to make consistent exclusions or admissions which would materially alter the main fact exhibited—the high positive peak at 13°.

To shew the effect of these corrections we must apply them to the adopted values of S—P. Without attempting a precise evaluation of the corrections, we can see the broad effect by using the three general means shewn at the foot of the Table.

General Corrections to S—P.

Δ	Tables	1913 Correction	New Values	δ (S—P)
°	s	s	s	s
10	119	− 1	118	
				+11
11	130	− 1	129	
				+21
12	140	+10	150	
				+11
13	151	+10	161	
				− 1
14	162	− 2	160	
				+11
15	173	− 2	171	

The important point is the sudden drop of δ (S—P), which appears in the above fictitious case actually with a negative sign. The interpretation of a negative result has obvious difficulties; but all we want is a *small* value of δ (S—P), to match values at large values of Δ, and thus make an anomalous reflection: and if the corrections indicated are even approximately correct, it is clear that this possibility lies open at present. To claim more would be to attach undue weight to somewhat scanty observations.

In the discussion so far only those records have been included where both P and S were observed, so that S—P could be formed, and the time determination eliminated. Such observations are, of course, specially liable to be used in determining the epicentre, in which case errors of the Tables are apt to be diluted by compromise. It may be remarked that in the early half of 1914 the simple Pulkovo determination was adopted for the epicentre, which, though increasing the accidental errors of the determinations, had the advantage of rendering them independent of stations near the quake. Perhaps this explains the larger positive residuals in Table I. for Δ = 10°—15°.

As an independent check, the cases were collected where P alone was observed, and are as in Table IV.

Table IV.

Corrections to P when P alone was observed in 1913.

0° — 5°	5° — 10°	10° — 15°	15° — 20°	20° — 25°	25° — 30°	30° — 35°	35° — 40°
+59	+42	+ 26	(+ 78)	+28	(+161)	+49	+47
+55	+40	+ 24	(+ 69)	+27	(+ 74)	+43	+45
+45	+32	+ 21	+ 24	+ 7	+ 34	+37	+40
+39	+24	+ 20	+ 23	+ 7	+ 11	+12	+16
+28	+21	+ 19	+ 14	+ 7	+ 9	+11	+ 4
+27	+15	+ 3	+ 11	+ 3	+ 3	+ 9	+ 3
+18	+15	+ 2	+ 4	+ 2	+ 3	+ 8	0
+10	+14	− 18	+ 4	− 4	− 1	+ 7	0
+ 7	+14	(−111)	+ 3	−20	− 4	− 1	− 1
+ 3	+13		+ 2	(−60)	− 5	− 5	− 1
0	+11		+ 1		− 14	− 6	− 3
− 4	+ 5		0		− 19	− 6	− 4
− 5	+ 4		0		(− 55)	− 8	−14
−52	+ 4		− 2		(− 99)	− 9	−52
	+ 3		− 3		(−109)	−11	−55
	+ 1		− 5			−11	−58
	+ 1		− 5			−24	
	− 2		(− 76)			−26	
	− 3		(− 97)			−37	
	− 3		(−165)			(−81)	
	− 3						
	− 5						
	− 9						
	− 9						
	− 9						
	−10						
	−11						
	−25						

In the 10°—15° group there is only one negative residual (excluding the mistake of −111s.), and this belongs to $\Delta = 11°$. These residuals were also examined degree by degree of Δ, and in this way shew a conspicuous peak at 15°. Further study of the residuals is being made, and it is possible that definite corrections to the Tables may be suggested in the next Report.

University Observatory, Oxford,

March 6, 1917.

1913. January 5d. 17h. 21m. 1s.

Adopted Origin: 31°·7N. 131°·0E.; Pulkovo, 18°·0N., 109°·0E. approximately.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	4·8	49	17	22	33	+18		—		...
Zi-ka-wei		W.	8·2	270	17	23	2	− 3		—		...
Tsingtau		W.	9·9	299	17	23	40	+10	17	26	7	+40
Taihoku		—	10·7	234	17	23	38	− 3		—		...
Manila	E.	W.	19·4	110	17	25	24	−11	17	29	0	−11
	N.	W.	19·4	110	17	25	24	−11	17	28	56	−15
Irkutsk		G.	28·3	325	17	27	13	+ 1	17	32	5	0
Calcutta	E.	M.	38·8	269	17	28	30	−15		—		...
Batavia		W.	44·3	216		—		...		—		...
Simla		O.E.	45·5	284	17	29	0	−38		—		...
Colombo	E.	M.	53·7	254	17	41	24	? S.R.		—		...
Kodaikanal	E.	M.	53·8	259	17	42	24	? S.R.		—		...
Baku		G.	63·9	303	17	31	38	0	17	40	19	+ 6
Pulkovo		G.	68·0	328	17	32	10	+ 5	17	41	14	+11
Makeyevka		G.	68·8	314		—		...	17	41	38	+25
Königsberg		W.	75·0	326		—		...		—		...
Lemberg		B.O.	76·3	320	17	29	22	−216		—		...
Breslau		W.	79·0	324	17	34	0	+46	17	43	42	+29
Hamburg		W.	80·7	329	17	43	48	? S.	? 17	43	48	+16
Vienna		W.	81·0	322	? 17	33	24	− 2		—		...
Göttingen		—	82·0	328		—		...	17	44	6	+19
Helwan	E.	M.	82·0	300	17	34	0	+29	17	43	54	+ 7
	N.	M.	82·0	300	17	35	0	+89	17	45	0	+73
Graz		W.	82·2	322	? 17	33	52	+20	17	44	12	+23
Zagreb		W.	82·2	321	? 17	34	0	+28	? 17	44	0	+11
Sarajevo		W.	83·3	318	17	32	44	−55	17	44	14	+13
Laibach		G.	83·5	321	17	44	7	? S.	? 17	44	7	+ 3
Triest		W.	84·1	321		—		...	17	44	12	+ 2
Edinburgh	E.	M.	84·1	336	17	44	0	? S.	? 17	44	0	−10
Heidelberg		—	84·2	327	17	44	22	? S.	? 17	44	22	+11
Aachen		W.	84·3	329		—		...	? 17	44	21	+ 9
Eskdalemuir		G.	84·5	336	17	44	26	? S.	? 17	44	26	+11
Paisley	E.	M.	84·5	337	17	45	0	? S.	? 17	45	0	+45
Strassburg		W.	85·0	326	? 17	49	0	? S.R.		—		...
Stonyhurst	E.	M.	85·5	335	17	43	36	? S.	? 17	43	36	−50
Bidston	E.	M.	86·0	335	17	54	42	? S.R.		—		...
West Bromwich		M.	86·3	334	17	45	24	? S.	? 17	45	24	+50
Kew	E.	M.	86·4	332	17	45	6	? S.	? 17	45	6	+31
Florence		A.	86·6	321	17	42	8	? S.	? 17	42	8	−140
Guildford	E.	M.	86·7	332	17	37	36	? P.R.	17	47	48	? S.R.
Paris		—	87·3	329		—		...	17	44	42	− 3
Shide		M.	87·4	332	17	39	30	? PR_2		—		...
Moncalieri	E.	S.	87·6	324	? 17	31	23	−161	17	44	39	−10
	N.	S.	87·6	324	? 17	31	23	−161	17	44	30	−19
San Fernando	N.	M.	100·9	326	17	57	0	? S.R.		—		...

1913. January 7d. 22h. 50m. 43s.

Adopted Origin : 22°·0N. 125°·5E. ;

Pulkovo, 16°·0N. 110°·0E.
Tiflis, 18°·5N. 127°·5E. ;
Irkutsk, 20°·7N. 119°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Manila		W.	8·6	211	22	53	33	+40		—		...
Zi-ka-wei		W.	9·3	338	22	53	0	− 3	22	54	48	− 6
Tsingtau		W.	14·8	343	22	54	14	− 4	22	56	48	−22
Osaka		O.	15·4	32	22	54	53	+26		—		...
Batavia		W.	33·7	215	22	57	54	+ 9		—		...
Calcutta	E.	M.	34·3	278	22	43	0	−890		—		...
Irkutsk		G.	34·4	337	22	57	23	−28	23	2	56	−33
Simla	E.	O.E.	43·8	293	23	4	0	? S.	23	4	0	−102
Colombo	E.	M.	46·6	258	23	5	18	? S.	23	5	18	−61
Bombay	E.	M.	49·3	277	23	5	36	? S.	23	5	36	−77
Sydney	E.	M.	61·0	156	23	6	54	? S.	23	6	54	−145
Baku		G.	65·3	306	23	1	19	−11	? 23	9	39	−33
Tiflis		G.	68·9	308	23	1	53	0	23	10	41	−13
Honolulu	E.	M.	70·3	74	23	13	18	? S.	23	13	18	+125
Makeyevka		G.	72·3	316	23	2	28	+13	23	11	31	− 6
Pulkovo		G.	73·7	329	23	2	26	+ 3	23	11	39	−14
Beirut	E.	M.	78·0	302	23	20	30	? S.R.		—		...
Czernowitz		Ma.	79·8	317	23	24	54	? S.R.		—		...
Königsberg		W.	80·4	326	23	3	6	+ 2	23	13	17	+ 6
Helwan	E.	M.	82·6	299	23	4	0	+43		—		...
	N.	M.	82·6	299	23	8	0	? P.R.		—		...
Breslau		W.	83·9	323	23	3	36	+12		—		...
Budapest	E.	W.	84·3	319	23	3	20	− 7		—		...
Vienna		W.	85·6	321	23	3	33	− 1	23	14	0	− 9
Hamburg		W.	86·3	328	23	4	0	+22		—		...
Zagreb		W.	87·2	319	23	3	33	−10	23	14	12	−14
Laibach		G.	87·8	320	23	4	0	+13	? 23	12	23	−130
Aachen		W.	89·9	327	23	4	0	+ 2		—		...
Edinburgh	E.	M.	90·9	334	23	5	12	+68		—		...
Florence	E.	O.A.	90·9	319	23	30	38	? S.R.	23	35	38	? L.
Paisley	E.	M.	91·4	334	23	7	0	+174		—		...
Stonyhurst	E.	M.	92·0	332	23	9	30	? P.R.		—		...
Moncalieri		S.	92·4	321	23	3	11	−61		—		...
Kew	E.	M.	92·5	330	23	15	30	? S.	23	15	30	+ 7
Bidston	E.	M.	92·5	332	23	6	12	+119	23	15	18	− 5
Guildford		M.	92·9	330	? 23	5	42	+87	? 23	17	18	+111
Paris		—	92·9	330	23	3	42	−33	23	11	59	−208
Shide	E.	M.	93·5	329	23	13	18	? S.	23	13	18	−136
San Fernando	N.	M.	105·9	321	23	27	42	? S.R.		—		...

1913. January 8d. 19h. 17m. 3s.

Adopted Origin : 22°·5N. 117°·5E.; Irkutsk, 22°·4N. 91°·6E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila	W.	8·6	157	19	19	28	+15		—		...
Zi-ka-wei	O.	9·3	21	19	20	17	+54	19	21	4	−10
	W.	9·3	21	19	19	44	+21		—		...
Tsingtau	W.	13·8	10	19	20	0	−26	19	22	47	−19
Osaka	O.	19·8	48	19	21	46	+ 4		—		...
Irkutsk	G.	31·4	344	19	23	19	−26	19	28	36	−25
Tashkent	G.	44·4	307	? 19	25	30	− 2	? 19	32	0	−10
Baku	G.	59·0	305	19	27	5	− 3	19	35	28	+14
Tiflis	G.	62·7	307	19	27	33	0		—		...
Pulkovo	G.	68·9	327	19	28	30	+17		—		...

1913. January 9d. 2h. 55m. 0s.

Adopted Origin : 21°·1N. 121°·7E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	6·5	186	2	57	43	? S.	2	57	43	−14
Zi-ka-wei		O.	10·1	359	2	58	10	+39	2	58	42	−49
	E.	W.	10·1	359	2	58	0	+29	2	59	34	+ 3
	N.	W.	10·1	359	2	58	0	+29	2	59	40	+ 9
Tsingtau		W.	15·0	356	2	58	12	−27	3	0	46	−46
Osaka		O.	18·2	39	2	59	19	0		—		...
Batavia		W.	30·9	210	3	1	48	+11		—		...
Irkutsk		G.	34·0	341	3	1	30	−35	3	6	38	−64
Colombo	E.	M.	42·9	257	3	10	24	? S.	3	10	24	+37
Kodaikanal	E.	M.	43·8	262	3	9	54	? S.	3	9	54	− 5
Tashkent		G.	48·3	307	3	3	44	−12		—		...
Riverview		—	61·7	152		—		...	3	14	12	+28
Baku		G.	62·9	306	3	5	20	−11	3	13	39	−21
Tiflis		G.	66·5	308	3	5	57	+ 3	3	14	39	− 4
Pulkovo		G.	72·6	328	3	6	28	− 6	3	15	42	−15
Honolulu	E.	M.	73·9	73	3	16	18	? S.	3	16	18	+ 8
Königsberg		W.	79·0	325		—		...	3	17	0	−12
Helwan	E.	M.	79·9	298	3	6	0	−78		—		...
	N.	M.	79·9	298	3	7	0	−18		—		...
Breslau		W.	82·4	322	3	7	35	+ 3	? 3	18	6	+16
Vienna		W.	84·0	321	3	7	32	−10	3	18	0	− 8
Hamburg		—	85·1	326		—		...	3	18	0	−20
Zagreb		W.	85·2	318	3	7	30	−19	? 3	18	0	−21
Göttingen		—	86·2	325		—		...	3	18	18	−14
Triest		W.	86·8	318	3	18	9	? S.	3	18	9	−30
Aachen		W.	88·7	325		—		...	3	18	39	−21
Edinburgh	E.	M.	90·1	333	3	15	30	? S.	3	15	30	−225
Paisley	E.	M.	90·6	333	3	19	0	? S.	3	19	0	−20
Moncalieri	E.	S.	90·8	320	3	1	14	−426	3	18	39	−43
	N.	S.	90·8	320	3	1	14	−426	? 3	18	26	−56
Stonyhurst	E.	M.	91·1	331	3	19	48	? S.	3	19	48	+23
Bidston	E.	M.	91·4	331	3	19	6	? S.	3	19	6	−22
Paris		—	91·6	325	3	24	59	? S.R.		—		...
Shide	E.	M.	92·4	328	? 3	9	18	+49		—		...
Rio Tinto	E.	M.	103·6	320	3	23	0	? S.	3	23	0	+91

1913. January 11d. 13h. 17m. 2s.

Adopted Origin: 3°·0N. 122°·0E.; Simla, 2°·6N. 126°·0E. or 65°·1N. 14°·5W.; Pulkovo, 6°·0N. 117°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila	E.	W.	11·3	5	13	20	3	+13	13	25	50	+230
	N.	W.	11·3	5	13	20	3	+13	13	25	4	+184
Batavia		W.	17·7	239	13	20	52	−23	13	23	58	−37
Zi-ka-wei		O.	28·0	2	13	23	18	+ 8	13	28	10	+ 9
		W.	28·0	2	13	23	1	− 9	13	27	55	− 6
Tsingtau		W.	33·0	3	13	23	46	−12	13	29	17	− 9
Osaka		O.	33·8	20	13	23	49	− 16	13	29	17	−22
Perth	E.	M.	35·4	189	13	23	36	−43		—		...
Adelaide	E.	M.	41·1	159	13	24	0	−66		—		...
Colombo	E.	M.	42·3	278	13	25	0	−15		—		...
Kodaikanal	E.	M.	44·8	282	13	25	36	+ 2		—		...
Sydney	E.	M.	46·0	146	13	25	6	−36	13	32	0	−30
Riverview		—	46·0	146	13	25	11	−31	13	31	39	−51
Bombay	E.	M.	50·6	292	13	26	42	+29		—		...
Simla	E.	O.E.	50·7	309	13	26	0	−13	13	33	0	−29
	N.	O.E.	50·7	309	13	26	0	−13	13	33	12	−17
Irkutsk		G.	51·3	346	13	26	6	−11	13	33	40	+ 3
Mauritius	E.	M.	67·0	247	13	23	0	−300		—		...
Seychelles	E.	M.	67·3	264	13	28	0	− 2		—		...
Samoa		—	67·8	106	13	27	54	−12	13	36	50	−12
Baku		G.	74·5	311	13	28	37	−10	? 13	38	8	−14
Tiflis		G.	78·4	312	13	29	1	−10	13	39	3	− 4
Honolulu	E.	M.	79·5	69	13	29	30	+12		—		...
Ksara		Ma.	85·1	304	13	29	39	−11	13	40	16	− 6
Beirut	E.	M.	85·4	304	13	28	30	−82		—		...
Pulkovo		G.	88·2	330	13	29	45	−23	13	40	9	−47
Helwan	E.	M.	89·0	300	13	29	0	−74		—		...
	N.	M.	89·0	300	13	29	30	−44		—		...
Czernowitz		Ma.	91·8	319	13	30	15	−13	13	40	43	−52
Lemberg		B.O.	92·8	321	13	26	57	−216		—		...
Königsberg		W.	94·1	326	13	30	48	+ 8	? 13	40	52	−67
Budapest		W.	96·4	319				—		—		...
Breslau		W.	96·9	323	13	31	1	+ 6	13	41	11	−71
Sarajevo	E.	W.	97·5	316	13	29	49	−70	13	41	7	−86
	N.	W.	97·5	316	13	29	49	−70	13	40	43	−110
Vienna		W.	97·9	320	13	30	50	−11	13	41	19	−78
Graz		W.	98·8	319	13	34	56	? P.R.	? 13	41	16	−90
Zagreb		W.	99·0	318	13	30	42	−25	? 13	41	30	−78
Hamburg		—	100·3	326	13	31	0	−14	13	41	27	−94
Triest		W.	100·4	318	13	41	26	? S.	13	41	26	−96
Göttingen		—	100·9	325	13	35	18	? P.R.		—		...
Pompeii	E.	O.A.	101·1	313	13	34	25	? P.R.		—		...
	N.	O.A.	101·1	313	13	35	30	? P.R.		—		...
Innsbruck		Ma.	101·4	320	13	34	54	? P.R.	? 13	41	25	−91
Padova	N.	V.	101·7	318	13	34	20	? P.R.	13	43	27	+13
Florence		A.	102·6	317	13	30	10	−75		—		...
Heidelberg		—	102·7	323		—		—		—		...
Cape Town	E.	M.	102·9	236	13	42	0	? S.	13	42	0	−85
Aachen		W.	103·6	324	13	31	30	0	13	41	39	−112
Moncalieri	E.	S.	104·6	318	? 13	31	0	−34	13	41	27	−133
	N.	S.	104·6	318	13	31	6	−28	13	41	27	−133
Edinburgh	E.	M.	106·1	332	13	36	0	? P.R		—		..
Paris		—	106·5	323	13	32	36	+63		—		...
Paisley	E.	M.	106·7	332	13	45	0	? S.	13	45	0	+60
Stonyhurst	E.	M.	106·8	330	13	29	12	−153		—		...
Guildford		M.	107·1	327	13	42	18	? S.	13	42	18	−106
West Bromwich		M.	107·2	328	13	39	0	? P.R.		—		...
Haslemere	E.	M.	107·3	327	13	39	50	? P.R.	13	45	20	+74
Bidston	E.	M.	107·4	329	13	33	30	+102	13	38	18	? P.R.
Shide	E.	M.	107·8	326	13	32	30	+41		—		...
Cork	E.	M.	111·0	330	13	39	0	? P.R.		—		...
Rio Tinto	E.	M.	117·3	315	13	39	0	? P.R.		—		...
San Fernando	E.	M.	117·5	314	13	40	42	? P.R.		—		...
	N.	M.	117·5	314	13	41	12	? P.R.		—		...
Ottawa		B.	128·9	16	13	38	25	? P.R	? 13	45	38	−77
Toronto	E.	M.	129·3	20	13	34	12	+46		—		...

1913. January 15d. 18h. 52m. 6s.

Adopted Origin: 19°·0N. 100°·0W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
St. Louis	E.	W.	21·4	21	18	58	4	+60	19	2	8	+72
	N.	W.	21·4	21	18	58	3	+59	19	2	8	+72
Toronto	E.	M.	30·1	30	18	58	12	+23		—		...
Ottawa		B.	33·2	32	18	59	15	+11	19	4	46	+11
							18	+14			53	+18
Harvard Univ.	E.	B.O.	33·8	40	18	59	0	− 9	19	4	28	−15
	N.	B.O.	33·8	40	18	58	56	−13	19	4	28	−15
Victoria	E.	M.	34·9	333	19	1	24	+126	19	8	18	+199
Honolulu	E.	M.	54·2	283	19	12	36	? S.R.		—		...
Fernando Noronha	E.	M.	70·2	101		—		—	19	12	0	−34
Cork	E.	M.	76·0	39	19	4	6	+ 5		—		...
Paisley	E.	M.	77·4	35	19	14	30	? S.	19	14	30	+65
Edinburgh	E.	M.	78·0	35	19	4	6	− 7		—		...
Bidston	E.	M.	78·8	37	19	14	18	? S.	19	14	18	+ 3
Stonyhurst	E.	M.	79·0	37	19	4	6	−13		—		...
Shide	E.	M.	80·7	39	19	8	0	? P.R.		—		...
Haslemere	E.	M.	80·9	39	19	16	14	? S.	19	16	14	+94
Guildford	E.	M.	81·0	39	19	4	12	−19	19	14	12	−29
Kew	E.	M.	81·0	38	19	14	0	? S.	19	14	0	−41
Rio Tinto	E.	M.	81·0	53	19	2	0	−151		—		...
San Fernando	E.	M.	81·7	54	19	12	0	? P.R.		—		...
	N.	M.	81·7	54	19	13	24	? S.	19	13	24	−84
Aachen		W.	85·0	38	? 19	4	51	− 3	? 19	15	6	−19
Hamburg		W.	85·9	34	19	5	6	+ 8		—		...
Heidelberg		—	86·2	38	19	5	0	− 1		—		...
Göttingen		—	86·8	36	19	5	5	+ 1	19	15	31	−13
Strassburg		W.	87·0	39	19	4	57	− 8	19	15	4	−43
Monealieri	E.	S.	88·5	42	19	2	31	−162	19	15	53	−10
Königsberg		W.	90·6	30	19	5	30	+ 5		—		...
Padova		V.	90·9	41	19	5	17	− 9	19	15	53	−36
Breslau		W.	90·9	34	19	5	30	+ 3	19	15	6	+83
Pulkovo		G.	91·5	23	19	5	34	+ 4	19	16	20	−15
Triest		W.	91·8	40		—		—	19	16	13	− 26
Graz		W.	92·1	38	19	5	23	−11	19	16	11	− 31
Vienna		W.	92·1	37	19	5	24	−10	19	16	30	−12
Zagreb		W.	93·0	39	19	5	23	−15	19	16	7	−44
							33	− 5	19	16	25	−26
Irkutsk		G.	105·6	345	19	12	0	? P.R.	19	21	50	? S.R.
Tiflis		G.	111·1	27		—		—	? 19	16	47	−167
Helwan	E.	M.	112·2	45	19	7	0	−14		—		...
	N.	M.	112·2	45	19	16	0	+526		—		...
Baku		G.	114·3	25		—		—	? 19	21	35	+85
Manila		W.	127·5	307	? 19	11	0	+158		—		...

1913. January 19d. 17h. 5m. 15s.

Adopted Origin: 1°·0N. 88°·0E.; Irkutsk, 3°·2N. 85°·9E.; Riverview, 1°·3S. 87°·0E.; Pulkovo, 4°·7N. 91°·7E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Colombo	E.	M.	10·1	306	17	7	18	—28		—		...
Kodaikanal	E.	M.	14·0	312	17	9	30	+49		—		...
Batavia		W.	20·1	111	17	10	20	+23	17	14	15	+35
Calcutta	E.	M.	21·5	1	17	9	42	—32		—		...
Bombay	E.	M.	23·3	322	17	9	42	—53		—		...
Simla	E.	O.E.	31·8	342	17	11	30	—30	17	17	0	—20
	N.	O.E.	31·8	342	17	11	24	—36	17	16	42	—38
Seychelles	E.	M.	33·3	261	17	19	30	? S.	17	19	30	+106
Manila	E.	W.	35·3	66	17	12	42	+11	17	16	16	—109
	N.	W.	35·3	66	17	12	42	+11	17	16	9	—126
Mauritius	E.	M.	36·3	233	17	11	24	—75		—		...
	N.	M.	36·3	233	17	17	0	? S.	17	17	0	—89
Perth	E.	M.	42·6	144	17	18	18	? S.	17	18	18	—100
Zi-ka-wei		O.	43·6	43	17	14	3	+25	17	20	28	+17
	E.	W.	43·6	43		—		—	17	20	17	+ 6
	N.	W.	43·6	43	17	13	45	+ 7	17	20	12	+ 1
Tsingtau		W.	46·5	37	17	14	0	+ 1	17	20	44	+ 4
Baku		G.	52·4	324	17	14	24	—13	17	21	36	—28
Irkutsk		G.	53·0	12	17	14	53	+12	17	22	14	+ 3
Osaka		O.	55·5	47	17	15	25	+27	17	23	0	+17
Ksara		Ma.	58·7	310	17	15	40	+22	17	23	20	— 2
Beirut	E.	M.	59·1	310	17	17	30	? P.R.		—		...
Helwan	E.	M.	60·9	304	17	16	0	+27		—		...
	N.	M.	60·9	304	17	15	0	—33	17	22	30	—80
Makeyevka		G.	63·7	325	17	15	54	+ 3	17	24	14	—10
Riverview		—	68·5	127	? 17	17	6	+43	17	25	42	+19
Sydney	E.	M.	68·6	127	17	23	6	? S.	17	23	6	—138
Czernowitz		Ma.	71·0	322	17	16	43	+ 5	17	25	46	— 7
Lemberg		B.O.	72·6	322	17	16	51	+ 2	17	26	13	+ 1
Pulkovo		G.	73·5	334	17	16	58	+ 4	17	26	17	— 6
Cape Town	E.	M.	73·8	234	17	26	18	? S.	17	26	18	— 9
Sarajevo	E.	W.	74·7	316	17	17	12	+10	17	26	24	—13
	N.	W.	74·7	316	17	17	18	+16	17	26	24	—13
Budapest		W.	75·2	319	17	17	17	+12	17	26	24	—19
Königsberg		W.	76·4	327	17	17	12	0	17	26	48	— 9
Laibach		G.	76·4	317	17	17	56	+44	17	27	59	+62
Pompeii		O.A.	76·9	312		—		—	17	26	58	— 5
Zagreb		W.	77·1	317	17	17	16	— 1	17	26	48	—17
Vienna		W.	77·1	320	17	17	16	— 1	17	26	54	—11
Breslau		W.	77·4	323	17	17	27	+ 9	17	27	1	— 7
Montecassino		Aga.	77·5	312	17	16	24	—55		—		...
Graz		W.	77·5	318	17	17	17	— 2	17	26	57	—13
Pola		W.	78·1	316		—		—	17	27	18	+ 2
Triest		W.	78·3	317		—		—	17	27	5	—14
Padova		V.	79·5	316	17	30	0	? S.	17	30	0	+147
Florence	E.	O.A.	79·7	314	17	19	13	+101	17	27	33	— 2
	N.	O.A.	79·7	314		—		—	17	27	13	—22
Innsbruck	N.E.	Ma.	80·2	318	17	17	32	— 3	17	27	25	—15
	S.E.	Ma.	80·2	318	17	17	32	— 3	17	27	27	—13
Göttingen		—	81·8	322	17	17	42	— 2	17	27	49	—10
Hamburg		—	82·1	324	17	17	51	+ 5	17	27	51	—11
Moncalieri		S.	82·4	315	17	14	59	—168	17	27	43	—22
Heidelberg		—	82·5	320	17	16	46	—62	17	27	50	—17
Strassburg		W.	82·7	319	17	17	47	— 2	17	27	57	—12
Aachen		W.	84·1	321	17	18	0	+ 2	17	28	14	—10
Paris		—	86·2	319	17	18	24	+15	17	28	29	—18
Kew	E.	M.	88·1	322	17	31	12	? S.R.		—		...
Guildford	E.	M.	88·3	321	17	18	21	— 1	17	26	15	—175
Haslemere	E.	M.	88·4	321	17	29	0	? S.	17	29	0	—11
Shide	N.	M.	88·8	321		—		—	17	28	30	—46
West Bromwich		M.	89·2	323	17	17	18	—68	17	27	36	—104
Stonyhurst	E.	M.	89·4	324	17	18	36	+ 9		—		...
Bidston	E.	M.	89·8	323	17	28	48	? S.	17	28	48	—39
Edinburgh	E.	M.	89·8	326	17	22	24	? P.R.		—		...
Eskdalemuir		G.	89·8	325	17	18	3	—27	17	28	52	—35
Paisley	E.	M.	90·5	326	17	28	0	? S.	17	28	0	—94
Granada	E.N.E.	Bif.	90·7	307	17	18	34	— 1	17	29	15	—21
	N.N.W.	C.	90·7	307	17	18	27	— 8	17	29	14	—22
San Fernando	E.	M.	92·7	306	17	29	30	? S.	17	29	30	—33
	N.	M.	92·7	306	17	29	0	? S.	17	29	0	— 3
Rio Tinto	E.	M.	93·0	308	17	26	0	? P.R.		—		...
Fernando Noronha	E.	M.	120·5	267	17	39	30	? S.R.		—		...
Ottawa		B.	131·4	345		—		—	? 17	40	0	?S.R.

1913. January 19-20d. 23h. 47m. 32s.

Adopted Origin: 46°·0N. 152°·5E.; Irkutsk, 49°·5N. 152°·9E.; Pulkovo, 49°·1N. 155°·3E.

Station and Component.		Machine.	Distance ° from Origin.	° Azimuth.	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	17·1	235	23	51	52	+14		—		...
Tsingtau		W.	26·0	259	23	53	16	−14	23	57	35	−19
Zi-ka-wei	E.	W.	28·1	250	23	53	41	0	23	58	15	−18
	N.	W.	28·1	250	23	53	37	− 4	23	58	17	−16
Irkutsk		G.	31·5	299	23	54	0	−14	23	59	8	−23
Manila		W.	41·0	230	23	55	49	+14		—		...
Honolulu	E.	M.	47·0	105	23	58	12	? P.R.	0	5	24	+131
Victoria	E.	M.	54·2	54	0	4	42	? S.	0	4	42	−13
Pulkovo		G.	64·2	330	23	58	18	+ 7	0	6	43	− 4
Batavia		W.	66·1	229	23	58	36	+12	0	7	10	0
Baku		G.	69·5	305	23	58	35	−11	0	7	29	−23
							38	− 8			35	−17
Makeyevka		G.	70·0	317	23	58	52	+ 3	0	7	48	−10
Tiflis		G.	71·3	309	23	59	1	+ 4	0	8	7	− 7
Kodaikanal	E.	M.	72·3	264	23	59	42	+38		—		...
Lemberg		B.O.	74·7	325	23	58	54	−25		—		...
Czernowitz		Ma.	74·8	324	23	59	23	+ 3	0	9	23	+27
Hamburg		W.	75·4	335	23	59	33	+10	0	8	58	− 4
Breslau		W.	75·6	330	23	59	16	− 9	0	9	9	+ 4
Edinburgh	E.	M.	76·1	345	0	9	12	? S.	0	9	12	+ 2
Eskdalemuir		G.	76·6	344	23	59	32	+ 1	0	9	8	− 8
Göttingen		W.	77·2	335	23	59	39	+ 5	0	9	19	− 4
Budapest		W.	78·0	327	23	59	37	− 2	0	9	45	+13
Stonyhurst	E.	M.	78·0	342	23	59	0	−39		—		...
Vienna		W.	78·3	329	23	59	43	+ 2	0	9	22	−14
Bidston	E.	M.	78·4	344	0	9	30	? S.	0	9	30	− 7
Aachen		W.	79·0	336	0	0	15	+30	0	9	36	− 8
West Bromwich		M.	79·1	342	23	59	0	−46	0	9	48	+ 3
Ottawa		B.	79·2	32		—		...	? 0	9	48	+ 2
Toronto	E.	M.	79·2	35	0	0	0	+14		—		...
Graz		W.	79·6	329	23	59	51	+ 2	0	9	41	−10
Heidelberg		—	79·7	334	23	59	52	+ 3	0	9	38	−14
Kew	E.	M.	79·7	340	0	9	30	? S.	0	9	30	−22
Strassburg		W.	80·5	334	23	59	55	+ 1	0	9	55	− 6
Zagreb		W.	80·6	328	23	59	52	− 3	0	10	0	− 2
Innsbruck		Ma.	80·6	332	23	59	55	0	0	9	55	− 7
Shide	E.	M.	80·6	341		—		...	0	10	12	+10
Sarajevo	E.	W.	81·8	326	0	0	0	+ 1	0	9	54	−17
	N.	W.	81·4	326	0	0	0	+ 1	0	10	0	−11
Triest		W.	81·4	329	23	59	56	− 3	0	9	56	−15
Paris		—	81·6	338	0	0	2	+ 2	0	10	3	−11
Ksara		Ma.	81·8	309	0	0	5	+ 4	0	10	1	−15
Beirut	E.	M.	82·0	309	0	8	0	? P.R		—		...
Moncalieri		S.	83·9	333	0	0	2	−11	0	10	20	−19
Montecassino		Aga.	85·9	327	23	58	50	−90		—		...
Pompeii		A.	85·5	326	23	59	53	−29		—		...
Helwan	E.	M.	87·3	309	0	1	0	+27	0	11	30	+14
	N.	M.	87·3	309	0	0	0	−33	0	10	30	−46
Granada		C.	94·1	338	0	0	50	−20	0	11	28	−61
San Fernando	E.	M.	95·3	340	0	10	30	? P.R.		—		...
	N.	M.	95·3	340	0	10	18	? P.R.		—		...

1913. January 27d. 19h. 38m. 9s.

Adopted Origin : 42°·5N. 36°·5E.; Czernowitz, 35°·0N. 44°·0E.; Pulkovo, 39°·3N. 43°·0E.; Aachen, 38°·0N. 44°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Tiflis		G.	5·5	18	19	39	33	0		—		...
Ksara	E.	Ma.	6·0	246	19	39	30	−11	19	41	23	+30
	N.	Ma.	6·0	246	19	39	24	−17	19	41	12	+19
Baku		G.	6·9	54	19	40	5	+11	19	41	17	+ 1
Helwan	E.	M.	11·4	239	19	41	0	+ 1		—		...
	N.	M.	11·4	239	19	42	0	+61		—		...
Makeyevka		G.	11·9	345	19	40	53	−13	19	42	41	−44
Czernowitz		Ma.	16·9	319	19	42	12	− 1	19	45	31	+ 6
Lemberg		B.O.	18·5	319	19	43	50	+78		—		...
Sarajevo	E.	W.	19·6	300	19	42	52	+ 7	19	46	31	+ 7
Budapest		W.	20·4	310	19	42	58	+ 3		—		...
Tashkent		G.	21·2	69	19	43	22	+18	? 19	47	20	+23
Zagreb		W.	22·1	305	19	43	16	+1	19	47	8	−8
							19	+4			28	+12
Pompeii		O.A.	22·1	291	19	42	15	−60		—		...
Vienna		W.	22·4	311	19	43	21	+ 2	19	47	17	− 5
Graz		W.	22·6	308	19	43	23	+ 2	19	47	30	+ 4
Laibach		G.	22·9	305	19	43	25	0	19	47	30	− 2
Breslau		W.	23·3	318	19	43	34	+ 5	19	47	42	+ 2
Triest		W.	23·4	303	19	43	31	+ 1	19	47	39	− 3
Königsberg		W.	23·7	329	19	43	32	− 2	19	47	30	−17
Pulkovo		G.	24·5	345	19	43	35	−7	19	47	38	−24
							38	−4		—		...
Padova		V.	24·5	301	19	43	49	+ 7		—		...
Florence	E.	A.	24·8	297	19	43	46	+ 1	19	48	16	+ 8
Innsbruck		Ma.	25·3	307	19	43	51	+ 1	19	48	0	−18
Strassburg		W.	26·1	301	19	44	32	+34		—		...
Göttingen		—	27·5	315	? 19	44	0	−12	19	48	58	− 1
Moncalieri	E.	S.	27·5	300	19	43	0	−72	19	48	54	− 5
	N.	S.	27·5	300	19	43	0	−72	19	48	51	− 8
Heidelberg		—	27·8	310	19	43	12	−63	19	47	52	−72
Hamburg		—	28·3	319	19	44	20	0	19	49	23	+10
Aachen		W.	29·6	312	19	44	28	− 5	19	49	37	+ 1
Guildford		M.	33·8	311		—		...	19	52	51	+125
West Bromwich		M.	34·9	313	19	49	30	? S.	? 19	49	30	−92
Bidston	E.	M.	35·6	314	19	51	42	? S.	19	51	42	+29
Eskdalemuir		G.	36·0	317	19	45	27	− 4	19	51	8	−11
Edinburgh	E.	M.	36·2	318	19	51	18	? S.	19	51	18	− 4
San Fernando	N.	M.	38·8	284	19	54	30	? S.	19	54	30	+152
Irkutsk		G.	43·4	49	19	46	47	+ 3	19	56	49	+201

1913. February 7d. 3h. 2m. 5s.

Adopted Origin: 5°·0N. 131°·0E.; Irkutsk, 15°·5N. 148°·8E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	13·7	315	3	8	0	? S.	3	8	0	− 6
Batavia		W.	26·6	246	3	10	40	+161		—		...
Zi-ka-wei		W.	27·7	342	3	8	22	+ 9	3	13	11	+12
		O.	27·7	342	3	8	28	+15	3	13	20	+21
Osaka		O.	30·0	7	3	7	38	−55		—		...
Adelaide	E.	M.	40·6	170	3	7	12	−173	3	18	6	+106
Sydney	E.	M.	43·3	155	3	17	36	? S.	3	17	36	+39
Riverview		—	43·3	155	3	11	6	+41	3	18	1	+64
Irkutsk		G.	52·2	340	3	11	22	− 4	3	18	39	−12
Tashkent		G.	65·6	313	3	13	47	+53		—		...
Honolulu	E.	M.	70·5	69	3	19	30	? P.R.	3	24	18	+101
Baku		G.	80·0	311	3	13	59	−25	3	24	44	+16
Tiflis		G.	83·8	311	3	15	0	+14	3	26	8	+57
Pulkovo		G.	91·0	330	3	15	30	+ 4	3	26	14	−15
Helwan	E.	M.	95·7	239	3	19	0	+188		—		...
	N.	M.	95·7	239	3	29	0	? S.	3	29	0	+102
Breslau		W.	100·7	324	3	20	0	? P.R.	? 3	31	0	+173
Moncalieri		S.	109·0	321		—		...	? 3	36	22	? S.R.
Paris		—	110·0	327		—		...		—		...
Shide	E.	M.	110·9	330	3	36	42	? S.R.		—		...

1913. February 20d. 8h. 58m. 48s.

Adopted Origin: 41°·0N. 144°·0E.; Irkutsk, 42°·0N. 140°·7E.; Pulkovo, 43°·9N. 144°·9E.; Tiflis, ? 48°·5N. 147°·3E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	9·2	230	9	1	21	+14		—		...
Zi-ka-wei	E.	W.	20·6	249	9	3	36	0	9	7	14	−10
	N.	W.	20·6	249	9	3	36	0	9	7	16	− 8
Irkutsk		G.	29·1	307	9	4	48	−19	9	9	24	−43
Manila		W.	33·1	224	9	5	44	− 1		—		...
Honolulu	E.	M.	52·3	94	9	16	0	? S.	9	16	0	+24
Tashkent		G.	54·4	297	9	8	22	− 1	9	15	47	−15
Batavia		W.	58·2	225	9	8	58	+10	9	16	53	+ 4
Victoria	E.	M.	62·2	49	9	17	24	? S.	9	17	24	−15
Bombay	E.	M.	63·8	273	9	18	24	? S.	9	18	24	+25
Pulkovo		G.	65·6	330	9	9	38	+ 1	9	18	9	−11
Kodaikanal	E.	M.	65·7	262	9	10	0	+23		—		...
Colombo	E.	M.	66·1	258	9	19	0	? S.	9	19	0	+34
Tiflis		G.	69·8	308	9	10	6	+ 2	9	18	58	−14
Königsberg		W.	72·8	330	9	10	44	+21	9	20	1	+13
Sydney	E.	M.	75·1	174	9	20	6	? S.	9	20	6	− 9
Riverview		—	75·1	174	? 9	11	0	+22	? 9	20	22	+ 7
Lemberg		B.O.	75·4	324	9	6	52	−228	9	20	38	+20
Breslau		W.	77·1	329	9	10	50	0	9	20	23	−15
Hamburg		—	77·5	334	9	11	0	+ 8	9	21	36	− 7
Edinburgh	E.	M.	79·2	342	9	11	42	+40		—		...
Göttingen		—	79·2	333	9	11	3	+ 1	9	20	49	−13
Vienna		W.	79·5	328	9	11	6	+ 2	9	20	54	−12
Paisley	E.	M.	79·5	343	9	18	0	? S.	9	18	0	−186
Eskdalemuir		G.	79·8	342	9	10	59	− 7	9	20	52	−17
Ksara		Ma.	80·2	307	9	10	57	−11	9	21	20	+ 7
Graz		W.	80·8	327	9	11	9	− 3	9	21	9	−12
Stonyhurst	E.	M.	80·9	341	9	12	24	+72		—		...
Aachen		W.	81·2	335	9	11	11	− 3	9	21	11	−14
Heidelberg		—	81·6	333	9	11	11	− 5	9	19	56	−94
Laibach		G.	82·0	327	9	11	7	−11	9	21	9	−25
West Bromwich		M.	82·0	340	9	10	18	−60	9	20	48	−46
Zagreb		W.	82·1	326	9	11	19	0	9	21	36	+ 1
Sarajevo	E.	W.	82·1	324	9	11	17	− 2	9	21	11	−24
	N.	W.	82·1	324	9	11	17	− 2	9	21	17	−18
Innsbruck	S.E.	Ma.	82·2	330	9	11	19	0	9	21	13	−23
	N.E.	Ma.	82·2	330	9	11	17	− 2	9	21	27	− 9
Kew	E.	M.	82·5	339	9	14	42	? P.R.		—		...
Triest		W.	82·6	327		—		...	9	21	48	+ 7
Guildford		M.	82·8	339	9	12	12	+49	9	21	24	−19
Paris		—	84·0	336	9	11	27	− 3	9	21	40	−16
Florence		A.	85·2	328	9	15	23	? P.R.	9	22	23	+14
Strassburg		W.	85·3	333	9	11	18	−20	9	21	26	−44
Moncalieri		S.	85·6	331	9	11	44	+ 5	9	21	53	−21
Helwan	E.	M.	85·7	307	9	10	30	−70		—		...
	N.	M.	85·7	307	9	11	24	−16		—		...
Montecassino		Aga.	86·0	325	9	11	40	− 1	9	17	0	? P.R.
Ottawa		B.	86·6	27	? 9	10	34	−71	? 9	21	58	−27
Toronto	E.	M.	86·8	30	? 9	19	36	? P.R.	9	22	24	− 3
Harvard University		B.O.	90·9	25		—		...	? 9	22	53	−18
Granada		Bif.	96·4	335	9	12	37	− 2	9	23	49	−19
San Fernando	E.	M.	97·9	336	9	24	0	? S.	9	24	23	−23
	N.	M.	97·9	336	9	22	30	? S.	9	22	30	−113

1913. February 27d. 16h. 22m. 34s.

Adopted Origin: 14°·0N. 39°·0E.; Pulkovo, 16°·0N. 39°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Helwan	E.	M.	17·4	337	16	28	0	+76		—		...
Ksara		Ma.	20·0	352	16	27	26	+11		—		...
Baku		G.	28·0	18	16	28	31	−11	16	33	16	−17
Tiflis		G.	28·1	9	16	28	39	− 4	? 16	33	27	− 8
Zagreb		W.	37·4	332	16	30	6	− 1		—		...
Tashkent		G.	37·9	38	16	30	14	+ 3	16	35	59	−12
Laibach		G.	38·1	331	16	29	18	−55		—		...
Graz		W.	38·5	333	16	30	16	0		—		...
Padova		V.	38·8	329	16	30	17	− 1		—		...
Vienna		W.	39·0	335	16	30	20	0		—		...
Innsbruck	S.E.	Ma.	40·4	331	16	30	35	+ 3		—		...
Moncalieri	N.	S.	40·8	326	16	30	21	−14	? 16	39	0	? S.R.
Breslau		W.	41·1	339	16	30	36	− 2	16	36	48	− 8
Granada		Bif.	44·3	309	16	31	8	+ 6	16	37	38	− 2
Aachen		W.	45·4	330	? 16	31	0	−10		—		...
Pulkovo		G.	46·2	354	16	31	16	− 1	16	37	56	− 9
Irkutsk		G.	63·9	38	16	33	26	+15	16	41	53	+ 7

1913. March 6d. 2h. 8m. 31s.

Adopted Origin: 30°·0N. 85°·0E.; Irkutsk, 29°·1N. 85°·1E.; Pulkovo, 33°·0N. 85°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Simla		O.E.	6·8	281	2	10	0	−14	2	10	8	−88
Tashkent		G.	17·0	316	? 2	12	33	− 3	? 2	15	13	−36
Kodaikanal	E.	M.	21·0	201	2	16	54	? S.	2	16	54	−21
Irkutsk		G.	26·4	27	2	14	49	+26	2	19	37	+36
Baku		G.	30·3	300	2	15	6	+ 4	2	19	47	−23
Zi-ka-wei		W.	31·2	78	? 2	14	47	−24		—		...
		O.	31·2	78	? 2	16	0	+49		—		...
Tiflis		G.	34·3	301	2	15	46	+ 8		—		...
Osaka		O.	42·4	70		—		...	? 2	23	59	+48
Helwan	N.	M.	46·0	284	2	24	0	? S.	2	24	0	+ 1
Pulkovo		G.	46·9	326	2	17	16 21	−1 +4	2	23	57	−14
Breslau		W.	53·7	314	2	18	12	+10		—		...
Graz		W.	55·1	309	2	18	23	+12	2	26	0	+ 7
Zagreb		W.	55·2	307	2	18	6	− 5		—		...
Hamburg		—	57·7	317	2	18	42	+14		—		...
Heidelberg		—	59·4	313		—		...	? 2	27	26	+39
Guildford		M.	64·4	316	2	17	36	−96	2	26	54	−55
Shide	N.	M.	65·0	316	2	19	0	−16		—		...
Granada		O.	71·4	303	2	20	17	+20		—		...

1913. March 6d. 11h. 3m. 42s.

Adopted Origin: 30°·0N. 83°·0E.; Irkutsk, 36°·6N. 74°·7E. Pulkovo, 32°·N. 84°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Simla		O.E.	5·1	283	11	4	9	−52		—		...
Calcutta	E.	M.	8·8	146	? 11	5	54	− 1		—		...
Bombay	E.	M.	14·6	222	11	10	12	? S.	11	10	12	+ 8
Tashkent		G.	15·8	319	? 11	7	39	+ 8	? 11	10	0	−32
Colombo	E.	M.	23·3	188	11	13	48	? S.	11	13	48	+35
Irkutsk		G.	27·1	29	11	9	49	+ 8	11	14	24	− 1
Baku		G.	28·7	301	11	9	39	−18	11	14	23	−31
Tsingtau		W.	31·6	70	11	15	54	? S.	11	15	54	+10
Tiflis		G.	32·7	301	11	10	27	− 8		—		...
Zi-ka-wei		W.	32·8	78	11	10	25	−11		—		...
		O.	32·8	78	11	10	57	+21	11	16	22	+19
Manila		W.	38·1	106	11	11	28	+ 7	11	17	26	+ 5
Beirut	E.	M.	40·2	289	11	15	30	? P.R.		—		...
Batavia		W.	42·8	144	? 11	13	0	+61		—		...
Seychelles	E.	M.	43·4	224	11	22	30	? S.R.		—		...
Osaka		O.	44·0	70	11	12	1	− 7	11	19	3	+19
Helwan	E.	M.	44·3	284	11	11	0	−70	11	17	42	−66
	N.	M.	44·3	284	11	18	0	? S.	11	18	0	−48
Pulkovo		G.	45·9	327	11	12	17	− 4	11	18	54	−15
Czernowitz		Ma.	46·5	310	11	12	25	− 1	11	19	1	−16
Lemberg		B.O.	47·9	312	11	14	36	? P.R.		—		...
Königsberg		W.	50·2	319		—		...	? 11	19	24	−39
Breslau		W.	52·3	314	11	13	11	+ 7		—		...
Vienna		W.	53·0	311	11	13	14	+ 6	11	24	0	+202
Zagreb		W.	53·7	308	11	13	16	+ 3	11	20	39	− 8
Graz		W.	53·7	310	11	13	16	+ 3	11	20	47	0
Laibach		G.	54·5	308	10	58	30	−888	11	8	48	−729
Triest		W.	55·1	308		—		...	? 11	21	4	0
Pompeii	E.	O.A.	55·4	302	11	13	30	+ 6		—		...
	N.	O.A.	55·4	302	11	13	35	+11		—		...
Mauritius	E.	M.	55·7	209	11	26	36	? S.R.		—		...
Hamburg		—	56·4	318	11	13	38	+ 8	11	25	48	+267
Florence		A.	57·2	306	11	14	29	+54	11	21	29	− 2
Strassburg		W.	58·5	312	11	13	54	+10		—		...
Aachen		W.	59·2	315		—		...		—		...
Moncalieri	E.	S.	59·3	308	11	14	3	+14	11	22	1	+ 4
Paris		—	61·9	314		—		...	11	22	30	− 1
Guildford		M.	63·2	317	11	7	57	−378	11	26	45	+240
Eskdalemuir		G.	63·7	322		—		...	? 11	23	15	+24
Shide	E.	M.	63·8	316	11	12	30	−109		—		...
Bidston	E.	M.	64·4	320	11	20	0	? P.R.	11	29	42	? S.R.
Cork	E.	M.	67·6	319	11	30	0	? S.R.		—		...
Granada		O.	69·9	303	11	15	9	+11	11	24	19	+12
San Fernando	N.	M.	72·1	304	11	32	0	? S.R.		—		...
Ottawa		B.	102·2	347		—		...	? 11	28	36	−83

1913. March 14d. 8h. 44m. 57s.

Adopted Origin: 7°·0N. 125°·0E.; Irkutsk, 5°·6N. 126°·3E.; Pulkovo, 11°·0N. 123°·5E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Manila		W.	8·5	333	8	47	38	+32		—		...
Batavia		W.	22·4	235	8	50	6	− 1	? 8	50	36	? P.R.
Zi-ka-wei		W.	24·4	353	8	50	38	+ 9	8	55	7	+18
Osaka		O.	29·3	18	8	51	21	+ 3		—		...
Tsingtau		W.	29·4	352	8	51	23	+ 4	8	56	38	+17
Perth	E.	M.	39·9	192	8	52	24	−27	8	55	54	? P.R.
Adelaide	E.	M.	43·9	164	8	53	12	−10	8	59	0	−58
Colombo	E.	M.	44·8	272	8	54	6	+37		—		...
Kodiakanal	E.	M.	47·1	278	8	54	54	+75		—		...
Sydney	E.	M.	47·8	150	8	53	36	−14	9	0	0	−48
Riverview		—	47·8	150	8	53	21	−29	9	0	10	−38
Irkutsk		G.	48·3	343	8	53	54	+ 1	9	1	7	−12
Simla		O.E.	50·7	301	8	54	2	− 6	9	1	4	−20
Bombay	E.	M.	52·0	288	8	54	24	+ 7		—		...
Tashkent		G.	60·0	314	8	55	18	+ 9		—		...
Samoa		—	66·1	108	8	56	46	+57	? 9	5	35	+60
Seychelles	E.	M.	70·6	263	8	57	0	+42		—		...
Mauritius	E.	M.	71·2	246	8	55	54	−27	9	5	36	− 1
Baku		G.	74·2	310	8	56	42	+ 2	9	5	25	−48
Honolulu	E.	M.	75·4	70	8	57	12	+24		—		...
Tiflis		G.	78·0	311	8	57	3	− 1	9	7	3	− 6
Ksara		Ma.	85·3	304	8	57	48	+ 2	9	7	59	−20
Beirut	E.	M.	85·7	304	8	57	0	−48		—		...
Pulkovo		G.	86·3	330	8	57	57	+ 5	9	8	14	−16
Helwan	E.	M.	89·6	300	8	58	12	+ 1		—		...
	N.	M.	89·6	300	8	58	18	+ 7		—		...
Czernowitz		Ma.	90·7	319	8	58	8	− 8	9	8	2	−76
Lemberg		B.O.	91·7	320	8	58	12	−10	9	4	8	? P.R.
Königsberg		W.	92·5	326	8	58	40	+14	9	8	30	−67
Budapest		W.	95·4	319	8	59	8	+26	9	9	14	−53
Breslau		W.	95·6	323	8	58	47	+ 3	? 9	9	18	−51
Vienna		W.	96·9	320	8	58	43	− 7	? 9	10	13	− 9
Graz		W.	97·8	320	8	58	57	+ 1	9	10	11	−20
Zagreb		W.	98·1	318	? 8	58	49	− 8	9	9	22	−72
Hamburg		—	98·6	327	8	58	55	− 5	9	9	12	−87
Laibach		G.	98·8	319	8	58	21	−40	9	9	24	−77
Victoria	E.	M.	98·8	39	8	58	36	−25		—		...
Göttingen		—	99·5	325	? 8	58	45	−20	9	10	26	−22
Triest		W.	99·5	319	8	59	4	− 1	? 9	9	28	−80
Pola		W.	99·6	318	8	58	50	−16	9	9	26	−83
Innsbruck	S.E.	Ma.	100·3	321	8	59	1	− 8	9	9	25	−91
Pompeii	E.	O.A.	100·6	314	8	59	4	− 6	9	8	59	−119
	N.	O.A.	100·6	314	8	59	4	− 6	9	9	4	−114
Montecassino		Aga.	100·7	315	8	58	38	−33	9	10	4	−55
Padova		V.	100·7	319	8	59	6	− 5	9	9	41	−78
Heidelberg		—	101·3	324	8	59	7	− 6	9	9	55	−70
Florence		A.	101·7	318	8	55	59	−196	9	1	0	? P.
Strassburg		W.	101·9	323	8	59	6	−10	9	10	11	−60
Aachen		W.	102·0	326	? 8	59	18	+ 1	9	11	3	− 9
Santa Clara		W.	103·5	49	9	3	48	? P.R.		—		...
Moncalieri		S.	103·6	320	8	58	2	−83	9	9	54	−92
Edinburgh	E.	M.	104·0	330	9	1	48	+141		—		...
Eskdalemuir		G.	104·4	332	8	59	36	+ 7		—		...
Paisley	E.	M.	104·6	333	9	9	30	? S.	9	9	30	−125
Stonyhurst	E.	M.	104·9	331	9	0	54	+83	9	9	48	−110
Paris		—	105·0	325	8	59	45	+14	9	9	57	−102
Kew	E.	M.	105·2	328	9	1	48	+136		—		...
Guildford		M.	105·4	328	8	58	42	−51	9	9	42	−121
West Bromwich	E.	M.	105·5	330	8	59	30	− 3	9	12	0	+16
Bidston	E.	M.	105·5	331	9	4	36	? P.R.	9	11	12	−32
Haslemere	E.	M.	105·5	328	9	0	12	+39	9	15	36	? S.R.
Shide	N.	M.	106·1	328	9	0	0	+24	9	12	0	+10
Cape Town	E.	M.	107·6	237	9	0	48	+65		—		...
Granada		Bif.	114·8	317	9	0	5	−11	9	11	46	−79
Rio Tinto	E.	M.	116·5	319	9	1	0	+36		—		...
San Fernando	E.	M.	117·0	317	9	5	0	? P.R.		—		...
St. Louis		W.	124·0	33	9	5	58	? P.R.	9	15	59	+103
Ottawa		B.	124·4	18	9	4	25	? P.R.		—		...
Azores	E.	M.	127·6	331	9	6	0	? P.R.		—		...
Pilar	E.	M.	154·0	163	9	6	0	...		—		...
Fernando Noronha	E.	M.	157·3	263	9	12	30	...		—		...

1913. March 18d. 1h. 20m. 45s.

Adopted Origin: 61°·5N. 146°·0E.; Irkutsk, 33°·8N. 19°·1E.; Tiflis, 18°0N. 136°·2E.; Pulkovo, 61°·0N. 137°·0E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Irkutsk	G.	24·1	265	1	26	20	+ 6	1	30	31	+ 1
Zi-ka-wei	W.	34·3	219		—		...	? 1	33	5	−24
Pulkovo	G.	49·1	323	1	29	41	− 5	1	36	33	−19
Baku	G.	58·0	297	1	30	48	+ 4	1	38	34	−10
Tiflis	G.	59·0	301	1	30	58	+ 8	1	38	57	+ 1
Czernowitz	Ma.	60·2	318	? 1	31	3	+ 5		—		...
Breslau	W.	60·4	326	1	31	4	+ 4	1	40	35	+82
Vienna	W.	63·1	325	1	31	23	+ 5		—		...
Zagreb	W.	65·5	324	1	32	0	+27		—		...
Laibach	G.	65·6	325	1	30	42	−52	1	43	13	+176
Helwan E.	M.	74·6	305	1	48	0	? S.R.		—		...

1913. March 23d. 20h. 47m. 3s.

Adopted Origin: 23°·0N. 142°·5E.; Irkutsk, 25°·4N. 142°·2E.; Tiflis, 31°·7N. 148°·3E.; Pulkovo, 26°·3N. 143°·3E

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Osaka		O.	13·2	334	20	50	43	+24		—		...
Zi-ka-wei		W.	20·4	298	20	51	54	+ 5	20	55	36	+ 2
Manila		W.	22·0	251	20	52	7	− 1	20	56	6	− 2
Irkutsk		G.	41·2	325	20	55	3	− 5	21	1	10	−16
Batavia		W.	45·5	234	20	52	38	−182	20	59	5	−200
Calcutta	E.	M.	49·6	280	20	55	24	−43		—		...
Honolulu	E.	M.	54·7	79	20	56	48	+ 8		—		...
Riverview		—	57·4	171	20	57	24	+24	21	4	9	−45
Sydney	E.	M.	57·5	171	21	4	6	? S.	21	4	6	−50
Simla		O.E.	57·9	293	20	57	0	− 1		—		...
Adelaide	E.	M.	58·1	184		—		...	21	5	36	+33
Colombo	E.	M.	62·2	266	21	3	9	? S.	21	3	0	−174
Tashkent		G.	62·7	306	20	57	40	+ 7	21	6	2	+ 2
Kodaikanal	E.	M.	63·2	268	20	57	0	−36		—		...
Bombay	E.	M.	64·6	281	20	58	12	+27		—		...
Victoria	E.	M.	75·6	43	21	0	6	+70	21	8	24	−12
Baku		G.	77·3	309	20	58	53	−13	21	8	37	−18
Tiflis		G.	80·3	311	20	59	22	− 2	21	9	18	−12
Pulkovo		G.	80·6	332	20	59	23	− 3	21	9	17	−16
Königsberg		W.	87·8	331	20	59	54	−13	21	10	9	−44
Czernowitz		Ma.	88·9	323	21	10	17	? S.	21	10	17	−48
Lemberg		B.O.	89·3	325	20	55	12	−303	21	10	48	−21
Ksara		Ma.	90·1	307	20	59	9	−71	? 21	9	20	−118
Beirut	E.	M.	90·3	307	21	7	30	? P.R.		—		...
Breslau		W.	91·8	329	21	0	18	−11	21	11	0	−36
Mauritius	E.	M.	93·0	249	21	10	30	? S.	21	10	30	−78
Budapest		W.	93·1	326	21	3	0	+144		—		...
Hamburg		—	93·1	334		—		...	21	10	44	−65
Vienna		W.	93·9	327	21	0	29	−11	21	10	48	−70
Göttengen		—	94·6	333		—		...	? 21	10	43	−82
Graz		W.	95·2	327	21	0	40	− 7	21	10	48	−83
Helwan	N.	M.	95·3	306	21	0	0	−48		—		...
Sarajevo		W.	95·8	323	21	0	50	− 1	21	10	53	−84
Zagreb	N.W.	W.	95·9	326	? 21	1	27	+36	21	10	52	−86
Laibach		G.	96·4	327	21	0	19	−35	21	10	53	−90
Aachen		W.	96·8	334	? 21	0	35	−21	21	10	57	−97
Heidelberg		—	96·9	332	21	4	35	? P.R.	? 21	11	47	−41
Innsbruck		Ma.	97·0	329	21	4	40	? P.R.		—		...
Triest		W.	97·1	327	21	4	43	? P.R.	21	10	51	−99
Stonyhurst	E.	M.	97·3	340	21	12	0	? S.	21	12	0	−32
Pola		W.	97·5	326	21	0	3	−57		—		...
Strassburg		W.	97·6	332	21	1	39	+38		—		...
Bidston	E.	M.	97·9	340	21	11	12	? S.	21	11	12	−86
Padova		V.	98·1	327	21	2	44	+100		—		...
West Bromwich		M.	98·4	339	21	3	0	+115	21	12	42	− 1
Kew	E.	M.	98·6	338	21	12	12	? S.	21	12	12	−33
Shide	N.	M.	99·6	338	21	5	30	? P.R.		—		...
Florence		A.	99·6	327	21	5	2	? P.R.	21	14	0	+65
Paris		—	99·7	335		—		...	21	12	15	−41
Pompeii		O.A.	100·0	323	21	5	0	? P.R.		—		...
Moncalieri		S.	100·5	329	21	5	4	? P.R.	21	14	6	+62
Toronto	E.	M.	103·0	30	21	8	42	? P.R.		—		...
Ottawa		B.	103·2	26	? 21	4	51	+191	? 21	11	29	−120
Granada		C.	111·8	331	21	5	38	? P.R.	? 21	17	0	+133
Rio Tinto	E.	M.	112·6	334	21	8	0	? P.R.		—		...

1913. March 24d. 10h. 34m. 11s.

Adopted Origin: 27°·5N. 53°·8E.; Tiflis, 27°·7N. 53°·4E.; Pulkovo, 26°·0N. 44°·0E. (approx.); Irkutsk, 28°·0N. 52°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Baku		G.	13·3	347	10	37	26	− 2	10	40	4	+ 2
Tiflis		G.	16·0	335	10	38	10	+ 7	10	41	16	+10
Ksara	E.	Ma.	16·6	297	10	38	16	+ 5	10	41	39	+19
Beirut	E.	M.	17·0	297	10	40	30	? S.	10	40	30	−59
Tashkent		G.	18·7	39	10	38	45	+ 9	10	42	23	+17
Bombay	E.	M.	19·4	112	10	43	0	? S.	10	43	0	+39
Helwan	E.	M.	19·8	282	10	40	0	+70		—		...
	N.	M.	19·8	282	10	43	0	? S.	10	43	0	+30
Simla		O.E.	20·7	74	10	39	1	+ 1		—		...
Czernowitz		Ma.	30·0	321	? 10	39	0	−99		—		...
Vienna		W.	35·5	316	10	41	20	− 9	? 10	48	30	+76
Graz		W.	35·7	314	10	41	24	− 6		—		...
Laibach		G.	36·0	312	10	41	49	+16		—		...
Pulkovo		G.	36·0	340	10	41	25	− 8	10	47	5	−16
Breslau		W.	36·3	321	10	41	29	− 6	? 10	53	36	? S.R.
Königsberg		W.	36·4	328	10	42	14	+38	10	47	8	−19
Padova		V.	37·6	310	10	40	30	−76	10	43	13	? P.R.
Innsbruck		Ma.	38·4	313	10	41	43	− 9	10	47	39	−16
Moncalieri		S.	40·4	308	? 10	43	37	? P.R.	10	51	26	? S.R.
Hamburg		—	41·2	321	10	42	27	+11		—		...
Aachen		W.	42·7	316		—		...	10	48	47	− 8
Paris		–	44·5	313	10	42	37	− 4	10	49	23	+ 3
Irkutsk		G.	44·7	42	10	42	38	− 4	10	49	18	− 4

1913. March 26d. 21h. 35m. 39s.

Adopted Origin: 4°·0N. 130°·0E.; Irkutsk, 40°·2N. 129°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Manila		W.	13·8	321	21	39	4	+ 2		—		—
Batavia		W.	25·3	246	? 21	41	0	−20		—		—
Zi-ka-wei	E.	W.	28·3	344	21	41	53	+ 3	21	43	37	−126
	N.	W.	28·3	344	21	41	47	− 3	21	43	33	−130
Osaka		O.	31·1	9	21	41	41	−37		—		...
Tsingtau		W.	33·3	346	21	42	32	− 6		—		...
Riverview		—	42·8	154		—		...	? 21	53	6	? S.R.
Irkutsk		G.	52·7	341	21	45	3	0	21	52	30	− 1
Simla		O.E.	56·5	305		—		...	? 21	51	4	−135
Tashkent		G.	65·6	314	21	46	20	− 8	21	54	56	−15
Honolulu	E.	M.	71·8	69	21	57	42	? S.	21	57	42	+75
Baku		G.	79·9	310	21	47	36	−21	21	57	26	−35
Tiflis		G.	83·7	312	21	49	6	+47	21	59	15	+31
Pulkovo		G.	91·4	330	21	48	50	−12	21	59	43	−14
Helwan	E.	M.	95·7	301	21	59	30	? S.	21	59	30	−22
Hamburg		—	102·7	328		—		...	? 22	0	0	−120
Laibach		G.	104·3	320		—		...	? 22	0	21	−114
Moncalieri		S.	109·1	321	? 22	0	45	? S.	? 22	0	45	−134
Paris		G.	110·2	326		—		...	? 22	4	10	+61
Shide	E.	M.	111·2	329	21	50	0	−42		—		...

1913. March 27d. 3h. 12m. 45s.

Adopted Origin: 15°·9N. 39°·0E.; Tiflis, 15°·9N. 39°·5E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Helwan	E.	M.	15·6	334	3	15	0	−92		—		...
	N.	M.	15·6	334	3	17	0	+28		—		...
Ksara		Ma.	18·1	350	3	17	10	+ 7	3	20	21	− 6
Tiflis		G.	26·2	10	3	18	38	+ 3	3	23	15	+ 4
Baku		G.	26·2	19	3	18	31	− 4	3	23	31	+20
							39	+ 4			34	+23
Bombay	E.	M.	32·3	80	3	20	54	? P.R.		—		...
Zagreb		W.	35·7	332	3	20	0	− 4	3	25	43	− 8
							10	+ 6				
Tashkent		G.	36·4	40	3	20	9	− 1	3	25	56	− 5
Laibach		G.	36·4	331	3	20	9	− 1	3	26	4	+ 3
Triest		W.	36·5	330	3	20	8	− 3	3	25	52	−10
Florence		A.	36·5	326	3	20	56	+45	3	28	56	? S.R.
Graz		W.	36·8	333	3	20	12	− 1	3	26	2	− 4
Padova		V.	37·2	328	3	20	15	− 2		—		...
							18	+ 1				
Vienna		W.	37·3	335	3	20	18	+ 1	3	26	6	− 7
Simla		O.E.	37·9	60	3	21	2	+40		—		...
Innsbruck		Ma.	38·7	330	3	20	28	− 1	3	21	45	? P.R.
Moncalieri	N.	S.	39·2	324	3	20	40	+ 7	3	26	43	+ 3
Colombo	E.	M.	40·9	98	3	29	0	? S.R.		—		...
Strassburg		W.	41·4	329	3	20	51	0		—		...
Granada		C.	43·2	308	3	21	4	− 1	3	27	36	0
Hamburg		—	43·9	335	3	21	0	−10		—		...
Pulkovo		G.	44·3	354	3	21	14	+ 1	3	27	49	− 2
Paris		—	44·3	326	3	20	36	−37		—		...
Calcutta	E.	M.	46·8	74	3	28	30	? S.	3	28	30	+ 7
Shide	E.	M.	47·4	326	3	22	0	+25		—		...
West Bromwich		M.	48·8	328	3	21	30	−14		—		...

The times given by Tiflis for P. and S. were altered by one minute.

1913. March 31d. 3h. 40m. 48s.

Origin: 49°·5N. 178°·0W.; Irkutsk, 54°·6N. 167°·4W.; Pulkovo, 52°·0N. 180°·2E. and 50°.3N. 177°·9E.; Tiflis, 43°·3N. 172°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Honolulu	E.	M.	32·3	144	3	47	54	+16		—		...
Victoria	E.	M.	35·1	70		—		...	? 3	53	36	− 9
Osaka		O.	36·9	264	3	48	12	− 5	3	54	8	− 3
Santa Clara	E.	W.	41·4	85	3	49	0	+ 6		—		...
Tsingtau		W.	45·9	278	3	49	29	+ 2	3	55	45	−30
Irkutsk		G.	46·7	305	3	49	32	− 1	3	56	21	− 4
Zi-ka-wei		W.	48·2	271	3	49	43	0	3	56	49	+ 5
Manila		W.	60·3	257	3	51	28	+26	3	56	14	−181
St. Louis		W.	60·5	64	3	51	14	+10	3	59	31	+13
Toronto	E.	M.	62·9	53	3	51	12	− 7	? 4	0	42	+54
Samoa		—	63·5	173		—		...	4	0	0	+ 5
Ottawa		B.	63·6	50	3	51	41	+17	4	0	22	+26
Pulkovo		G.	68·3	345	3	51	57	+ 3	4	0	41	−13
						52	3	+ 9			54	0
Königsberg		W.	74·5	349	3	52	44	+10	4	2	6	− 2
Edinburgh	E.	M.	74·5	3	4	2	12	? S.	4	2	12	+ 4
Paisley	E.	M.	74·5	4	4	2	30	? S.	4	2	30	+22
Eskdalemuir		G.	75·1	3	3	52	47	+ 9	4	2	19	+ 4
Calcutta	E.	M.	75·3	288	3	54	18	+100		—		...
Simla		O.E.	75·5	301	3	52	8	−31	4	2	4	−16
Stonyhurst	E.	M.	76·6	3	4	1	30	? S.	4	1	30	−62
Hamburg		—	76·7	355	3	52	50	+ 3	4	2	38	+ 5
Bidston	E.	M.	77·0	3	4	2	24	? S.	4	2	24	−13
West Bromwich		M.	77·9	2	3	53	12	+18	4	3	0	+13
Cork	E.	M.	78·2	7	3	55	0	? P.R.		—		...
Breslau		W.	78·6	351	3	53	46	+47		—		...
Göttingen		W.	78·7	355	3	53	0	+ 1	4	2	58	+ 2
Kew	E.	M.	79·0	1	4	3	12	? S.	4	3	12	+12
Guildford		M.	79·2	2	3	54	3	+61	4	3	12	+10
Haslemere	E.	M.	79·3	2	4	5	20	? S.	4	5	20	+137
Lemberg		B.O.	79·4	346	3	53	35	+32		—		...
Shide	E.	M.	79·7	2	3	53	42	+37		—		...
Aachen		W.	79·7	357	3	53	6	+ 1	4	3	6	− 2
Czernowitz		M.	80·0	344	3	53	7	0	4	3	12	+ 1
Heidelberg		—	80·9	356	3	53	12	0	4	3	23	+ 1
Tiflis		G.	81·4	329	3	53	13	− 2	4	3	33	+ 6
							19	+ 4				
Vienna		W.	81·5	350	3	53	16	0	4	3	48	+19
Paris		—	81·7	360	3	53	16	− 1	4	3	30	− 1
Strassburg		W.	81·8	356	3	53	18	+ 1	4	3	34	+ 2
Graz		W.	82·7	351	3	53	24	+ 2	4	3	42	0
							29	+ 7				
Innsbruck		Ma.	82·9	354	3	53	21	− 2	4	3	10	−34
Laibach		G.	83·9	351	3	53	33	+ 4	4	3	43	−12
Zagreb		W.	83·9	350	3	53	30	+ 1	4	3	52	− 3
							36	+ 7		4	2	+ 7
Triest		W.	84·3	352	3	53	35	+ 3	4	4	7	+ 8
Padova		V.	84·7	353	3	53	33	− 1	4	3	55	− 9
Pola		W.	85·1	352	3	53	36	− 1	4	4	2	− 6
Batavia		W.	85·2	255	3	54	0	+23		—		...
Moncalieri		S.	85·4	356	3	53	46	+ 8	4	4	10	− 1
Sarajevo	E.	W.	85·5	348	3	53	33	− 6	4	4	15	+ 2
	N.	W.	85·5	348	3	53	33	− 6	4	3	51	−22
							42	+ 3				
Florence	N.	A.	86·4	353	3	53	53	+10	4	6	33	+131
Bombay	E.	M.	87·5	297	4	3	24	? S.	4	3	24	−71
Riverview		—	87·7	205	3	54	0	+ 9	4	4	36	− 1
Montecassino		Aga.	88·4	351	3	54	0	+ 5	4	5	0	+16
Pompeii	E.	O.A.	89·1	351	3	54	0	+ 1	4	4	0	−52
	N.	O.A.	89·1	351	3	54	2	+ 3	4	5	0	+ 8
Azores	E.	M.	89·4	22	4	4	30	? S.	4	4	30	−25
Beirut	E.	M.	91·4	333	4	2	30	? S.	? 4	2	30	−166
Ksara		Ma.	91·4	332	3	54	11	0	4	4	37	−39
Kodaikanal	E.	M.	91·5	288	4	5	0	? S.	4	5	0	−18
Rio Tinto	E.	M.	92·4	7	3	58	0	? P.R.		—		...
Colombo	E.	M.	92·6	284	4	5	42	? S.	4	5	42	+13
Adelaide	E.	M.	92·8	214	4	5	18	? S.	4	5	18	−13
Granada		Bif.	93·2	4	3	54	17	− 4	4	4	46	−49
San Fernando	E.	M.	93·7	7	4	5	0	? S.	4	5	0	−41
	N.	M.	93·7	7	4	6	0	? S.	4	6	0	+19
Helwan	E.	M.	96·4	335	3	58	0	? P.R.		—		...

1913. April 2-3d. 23h. 52m. 48s.

Adopted Origin: 33°·5N. 133°·2E.; Irkutsk, 37°·7N. 71°·8E.; Pulkovo, 29°·0N. 121°·0E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka	O.	2·2	55	23	54	1	+39		—		...
Zi-ka-wei	W.	10·2	261	23	55	12	− 9		—		...
Tsingtau	W.	10·9	287	23	55	30	− 1	? 23	58	13	+33
Manila	W.	21·9	213	23	57	54	+ 2		—		...
Irkutsk	G.	28·0	321	23	58	49	− 7	0	3	31	−16
Batavia	W.	46·5	218		—		...	? 0	7	53	−30
Tashkent	G.	50·2	299	0	1	51	− 5	0	8	57	−12
Honolulu E.	M.	61·2	82	0	12	36	? S.	0	12	36	+70
Baku	G.	64·5	303	0	3	23	− 7	0	11	55	−12
Tiflis	G.	64·7	306	0	4	0	+11	0	12	42	− 1
Pulkovo	G.	67·5	328	0	4	6	+17	0	12	50	+ 6
Riverview	—	69·5	164		—		...	? 0	14	24	+76
Königsberg	W.	74·6	327		—		...	? 0	12	24	−105
Czernowitz	Ma.	75·7	319	? 0	4	47	+ 6		—		...
Graz	W.	81·9	322		—		...	? 0	16	0	+27
Zagreb	W.	82·7	321	0	5	0	−22	0	15	30	−12
Laibach	G.	83·1	322		—		...	? 0	15	38	− 8
Eskdalemuir	G.	83·7	337		—		...	0	15	44	− 9
Heidelberg	—	83·7	327		—		...	? 0	15	0	−53
Aachen	W.	83·8	330		—		...	? 0	15	45	− 9
West Bromwich E.	M.	85·5	335	0	14	0	? S.	0	14	0	−133
Guildford	M.	86·0	333	0	5	3	−38	? 0	14	42	−96
Florence	A.	86·4	322	0	21	22	? S.R.		—		...
Paris	—	86·7	330		—		...	? 0	16	0	−26
Moncalieri E.	S.	87·3	325	0	16	5	? S.	0	16	5	−27
Granada	C.	98·7	327	0	7	30	+38		—		...

1913. April 7d. 13h. 47m. 21s.

Adopted Origin: 30°·6N. 144°·0E.; Irkutsk, 35°·0N. 134°·5E.; Pulkovo, 30°·6N. 141°·8E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Osaka		O.	8·3	302	13	49	18	− 9		—		...
Zi-ka-wei		W.	19·4	278	? 13	52	15	+23		—		...
Tsingtau		W.	20·5	292	13	50.	52	−76		—		...
Manila		W.	26·5	238	13	53	14	0	13	57	42	−11
Irkutsk		G.	36·2	319	13	55	11	+26	13	59	59	−35
Calcutta	E.	M.	50·0	275	14	2	36	? S.	14	2	36	−64
Batavia		W.	51·2	230		—		...	14	4	0	+ 5
Honolulu	E.	M.	52·4	85	14	4	48	? S.	14	4	48	+38
Simla		O.E.	56·5	289		—		...	? 14	4	0	−61
Tashkent		G.	59·6	303	13	57	30	0	14	5	32	− 7
Bombay	E.	M.	64·8	278	14	1	54	? P.R.		—		...
Baku		G.	73·6	308	13	58	48	−13	14	8	14	−16
Pulkovo		G.	74·7	331	13	59	9	+ 1	14	8	38	− 5
Tiflis		G.	76·4	311		—		...	? 14	8	42	−21
Königsberg		W.	81·9	331		—		...	14	9	56	−10
Czernowitz		Ma.	83·6	324		—		...	? 14	10	13	−12
Lemberg		B.O.	83·9	325	13	59	20	−30	14	10	10	−18
Breslau		W.	86·0	330	? 14	0	23	+ 1	? 14	10	38	−13
Beirut	E.	M.	86·8	308	14	8	0	? S.	14	8	0	−180
Hamburg		—	86·9	335	14	0	42	+23	14	10	51	−10
Budapest		W.	87·6	326	14	10	52	? S.	14	10	52	−17
Vienna		W.	88·3	328		—		...	? 14	10	48	−28
Göttingen		W.	88·5	334	14	0	48	+19		—		...
Edinburgh	E.	M.	89·1	342	14	12	54	? S.	14	12	54	+89
Eskdalemuir		G.	89·6	342	14	0	31	− 4	14	11	12	−19
Graz		W.	89·6	328		—		...	14	11	13	−18
Zagreb		W.	90·5	327		—		...	14	11	6	−34
Aachen		W.	90·6	335		—		...	14	11	16	−25
Laibach		G.	90·8	328	14	12	2	? S.	14	12	2	+19
Heidelberg		—	90·9	333	14	2	53	+131	14	11	26	−18
Bidston	E.	M.	91·3	341	14	11	12	? S.	14	11	12	−36
Triest		W.	91·5	328	? 14	10	54	? S.	? 14	10	54	−57
West Bromwich		M.	91·8	340	14	3	30	+163		—		...
Helwan	E.	M.	91·9	307	14	4	0	? P.R.	14	12	12	+17
Kew	E.	M.	92·2	339	14	11	12	? S.	14	11	12	−46
Guildford		M.	92·4	339	14	1	0	+10	? 14	11	18	−42
Padova		V.	92·5	329	14	1	1	+10	14	11	13	−48
Paris		—	93·5	336		—		...	14	11	53	−18
Florence		A.	94·0	328	14	4	38	? P.R.	14	17	3	? S.R.
Moncalieri		S.	94·6	331	13	57	4	−238	14	11	4	−79
Granada		O.	105·8	334	14	2	0	+ 1		—		...
San Fernando	E.	M.	107·3	335	14	16	0	? S.	14	16	0	+95

1913. April 8d. 2h. 20m. 23s.

Adopted Origin: 30°·6N. 141°·8E.; Pulkovo, 30°·6N. 141°·8E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka	O.	6·7	308	2	22	18	+13		—		...
Zi-ka-wei	W.	17·5	277	? 2	22	57	−97		—		...
Tsingtau	W.	18·7	293	2	24	48	0		—		...
Manila	W.	24·9	235	2	26	28	+28		—		...
Irkutsk	G.	34·9	319	2	27	24	−11		—		...
Honolulu E.	M.	54·3	84	2	38	0	? S.	2	38	0	+24
Baku	G.	72·1	307	2	31	51	− 3	2	41	12	− 2
Pulkovo	G.	73·6	331	2	32	8	+ 5	2	41	37	+ 5
Czernowitz	Ma.	82·5	323	2	43	13	? S.	2	43	13	− 2
Hamburg	W.	86·0	334	2	33	36	+20	2	43	51	− 2
Vienna	W.	87·2	327	2	44	6	? S.	2	44	6	0
Graz	W.	88·5	327		—		...	2	44	13	− 8
Eskdalemuir	G.	89·0	341	2	33	32	− 1	2	44	22	− 4
Laibach	G.	89·7	327	? 2	33	42	+ 5	? 2	44	36	+ 2
Aachen	W.	89·7	334		—		...	? 2	44	18	−16
Heidelberg	—	89·9	332	2	35	0	+82	2	44	24	−12
Helwan E.	M.	90·3	306	2	38	0	? P.R.		—		...
Guildford	M.	91·6	338	2	42	0	? S.	? 2	42	0	−174
Florence	A.	92·9	327		—		...	2	43	47	−80
Moncalieri	S.	93·6	329	? 2	44	21	? S.	? 2	44	21	−54

1913. April 13d. 6h. 39m. 58s.

Adopted Origin: 32°·2N. 134°·6E.; Eskdalemuir, 33°·0N. 128°·0E. Irkutsk, 32°·2N. 134°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	2·6	15	6	41	29	+59		—		...
Zi-ka-wei		W.	11·2	270	6	42	27	−18		—		...
Tsingtau		W.	12·4	292	6	42	57	− 6	6	45	12	−15
Manila		W.	21·5	218	6	45	0	+ 3		—		...
Irkutsk		G.	29·7	285	6	46	12	−11	6	51	16	− 11
Calcutta	E.	M.	41·9	270	6	48	54	+46		—		...
Simla		O.E.	46·3	321		—		...	?6	55	7	−49
Batavia		W.	46·6	220	7	3	0	? S.R.		—		...
Tashkent		G.	51·9	300	6	49	20	+ 3	6	56	39	− 2
Bombay	E.	M.	56·6	273	6	53	12	? P.R.		—		...
Colombo	E.	M.	56·7	256	7	2	0	? S.R.		—		...
Kodaikanal	E.	M.	56·9	261	7	2	0	? S.R.		—		...
Honolulu	E.	M.	60·3	82	6	59	42	? S.	6	59	42	+77
Baku		G.	66·1	304	6	50	50	0	6	59	34	− 2
Tiflis		G.	69·1	307	6	51	20	+10	7	0	8	+ 5
Pulkovo		G.	69·2	329	6	51	24	+14	7	0	24	+10
Königsberg		W.	76·3	327	?6	50	41	−74	7	2	40	+61
Lemberg		B.O.	77·8	321	7	1	30	? S.	7	1	30	−26
Beirut	E.	M.	79·3	303	7	1	0	? S.	7	1	0	−73
Breslau		W.	80·3	326	6	52	32	+13	?7	2	47	+22
Hamburg		—	81·7	330	6	52	42	+16	7	2	48	+ 7
Vienna		W.	82·4	324	6	52	44	+14	7	3	0	+12
Göttingen		W.	83·2	329	6	52	44	+ 9	7	3	20	+23
Graz		W.	83·7	323	6	52	58	+20	7	3	9	+ 6
Sarajevo		W.	84·3	319	6	52	40	− 2	7	3	0	− 9
Helwan	E.	M.	84·4	302	6	53	0	+18	7	3	36	+26
	N.	M.	84·4	302	7	3	0	? S.	7	3	0	−10
Laibach		G.	84·9	323	6	51	43	−62	7	3	0	−16
Edinburgh	E.	M.	84·9	338	7	3	30	? S.	7	3	30	+14
Paisley	E.	M.	85·3	338	7	3	0	? S.	7	3	0	−20
Eskdalemuir		G.	85·3	337	6	53	1	+14	7	3	19	− 1
Aachen		W.	85·4	330	6	52	24	−24	7	3	19	− 2
						53	7	+19			27	+ 6
Heidelberg		—	85·5	328	6	53	22	+34	7	3	46	+24
Innsbruck		Ma.	85·5	325	6	53	0	+12	7	3	34	+12
											36	+14
Triest		W.	85·5	323	?7	3	12	? S.	?7	3	12	−10
Stonyhurst	E.	M.	86·3	336	7	4	12	? S.	7	4	12	+41
Padova		V.	86·6	329	6	52	45	−10	7	3	44	+ 9
Bidston	E.	M.	86·8	336	7	2	42	? S.	7	2	42	−55
West Bromwich	E.	M.	87·2	335	6	56	0	? P.R.	7	3	0	−41
Kew	E.	M.	87·4	334	7	4	6	? S.	7	4	6	+23
Guildford		M.	87·7	334	6	54	24	+83	7	3	54	+ 7
Florence		A.	88·1	323	6	47	45	−318	7	3	45	− 6
Paris		—	88·4	331	6	53	12	+ 7	7	3	53	− 1
Moncalieri		S.	89·0	325	7	3	45	? S.	7	3	45	−16
Limerick	E.	—	89·3	339	7	4	36	? S.	7	4	36	+32
	N.	—	89·3	339		—		...	?7	2	36	−88
Mauritius	E.	M.	89·9	246	7	3	30	? S.	7	3	30	−41
Ottawa		B.	97·6	21		—		...	?7	5	0	−30
Granada		Bif.	100·3	327	6	55	25	+75	?7	6	28	+31
San Fernando	N.	M.	102·1	329	7	4	0	? S.	7	4	0	−134

1913. April 14d. 7h. 48m. 27s.

Adopted Origin: 24°·6N. 118°·5E.; Pulkovo, 23°·0N. 117°·0E.; Irkutsk, 25°·8N. 123°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Taihoku		O.	2·8	81	7	49	5	− 6	7	49	16	−28
Zi-ka-wei	E.	W.	7·1	20	7	50	34	+19	7	52	2	+22
	N.	W.	7·1	20	7	50	28	+13	7	51	58	+18
Manila		W.	10·3	166	7	50	36	−25		—		...
Tsingtau		W.	11·6	7	7	51	30	+10	7	54	30	− 6
Osaka		O.	17·8	51	7	52	46	+ 4		—		...
Calcutta	E.	M.	27·7	271	7	58	18	? S.	7	58	18	−63
Irkutsk		G.	29·7	342	7	54	47	− 5	7	59	55	− 1
Batavia		W.	32·8	202	? 7	54	0	−81		—		...
Simla		O.E.	36·9	290		—		...	? 8	0	3	−107
Colombo	E.	M.	41·0	252	8	3	36	? S.	8	3	36	+48
Bombay	E.	M.	42·7	273	8	4	48	? S.R.		—		...
Tashkent		G.	43·9	305	7	57	0	+ 8	8	3	45	+17
Baku		G.	58·6	304	7	58	31	+ 1	8	6	55	+22
Tiflis		G.	62·2	306	7	59	5	+12	8	7	47	+29
Pulkovo		G.	68·1	327	7	59	39	+ 7	8	8	42	+12
Königsberg		W.	74·5	324		—		...	8	9	48	+ 1
Helwan	E.	M.	75·7	297	8	0	0	−20		—		...
	N.	M.	75·7	297	8	9	0	? S.	8	9	0	−61
Breslau		W.	77·9	321	8	0	40	+ 7	? 8	11	0	+34
Vienna		W.	79·4	318	8	0	43	+ 1		—		...
Graz		W.	80·5	318	8	1	18	+29		—		...
Hamburg		—	80·6	325		—		...	8	11	0	+ 3
Aachen		W.	84·1	324		—		...		—		...
Edinburgh	E.	M.	85·6	331	8	17	48	? S.R.		—		...
Eskdalemuir		G.	86·0	331		—		...	? 8	12	19	+22
Paisley	E.	M.	86·2	332	8	10	0	? S.	8	10	0	−119
Stonyhurst	E.	M.	86·6	330	8	13	12	? S.	8	13	12	+68
Bidston	E.	M.	87·1	329	8	13	18	? S.	8	13	18	+69
Paris		—	87·1	324	8	4	0	+153	8	12	11	+ 2
Guildford		M.	87·2	327	8	2	27	+60	8	13	12	+62
West Bromwich		M.	87·2	328	8	13	0	? S.	8	13	0	+50

1913. April 18d. 13h. 13m. 0s.

Adopted Origin: 8°·0N. 128°·0E.; Irkutsk, 11°·2N. 125°·5E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	9·5	314	13	15	18	− 5		—		...
Zi-ka-wei	E.	W.	24·0	346	13	18	24	− 4		—		...
	N.	W.	24·0	346	13	18	22	− 6	13	22	26	−18
Batavia		W.	25·5	237	13	19	55	+72	13	24	25	+72
Osaka		O.	27·5	13	13	19	14	+11	13	24	22	+32
Adelaide	E.	M.	44·1	167	13	28	12	? S.	13	28	12	+ 9
Riverview		—	47·2	154	? 13	22	36	+48	? 13	29	12	+28
Irkutsk		G.	48·3	341	13	21	51	− 5	13	28	30	−28
Tashkent		G.	61·4	313	13	23	26	+ 5	13	31	33	− 8
Honolulu	E.	M.	72·3	70	13	34	18	? S.	13	34	18	+24
Baku		G.	75·8	310	13	24	49	− 5	13	34	21	−14
Tiflis		G.	79·7	311	13	26	22	+65	13	36	6	+46
Pulkovo		G.	87·0	330	13	26	1	+ 2	13	36	33	− 8
Beirut	E.	M.	87·6	304	13	36	0	? S.	13	36	0	−48
Helwan	N.	M.	91·7	301	13	38	0	? S.	13	38	0	+28
Czernowitz		Ma.	92·0	319	? 13	37	26	? S.	? 13	37	26	− 9
Vienna		W.	98·0	321		—		...	? 13	42	18	? S.R.
Graz		W.	99·0	320	13	35	42	? P.R.		—		...
Zagreb		W.	99·3	319		—		...	13	37	7	−102
Hamburg		—	99·4	328		—		...	? 13	37	0	−110
Laibach		G.	100·0	320		—		...	? 13	38	18	−38
Heidelberg		—	102·3	325		—		...	? 13	38	0	−78
Moncalieri	N.	S.	104·8	321	13	31	14	? P.R.		—		...

1913. April 18d. 19h. 2m. 0s.

Adopted Origin : 9°·0N. 128°·0E. ; Irkutsk, 13°·3N. 129°·7E. ; Tiflis, 5°·2N. 121°·2E. ; Pulkovo, 13°·5N. 130°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	8·9	310	19	4	25	+11		—		...
Tōhoku		O.	17·2	340	19	6	11	+ 2		—		...
Zi-ka-wei		W.	23·0	345	19	7	28	+11	19	11	33	+ 8
Batavia		W.	26·0	235	19	8	1	+13	19	12	21	− 1
Osaka		O.	26·6	14	19	8	14	+20	19	13	19	+46
Tsingtau		W.	28·0	347	19	8	15	+ 7	19	12	54	− 5
Calcutta	E.	M.	40·3	294	19	7	42	−135		—		...
Adelaide	E.	M.	45·0	168	19	13	0	? P.R.		—		...
Irkutsk		G.	47·4	340	19	10	57	+ 7	19	17	33	−13
Colombo	E.	M.	47·8	273	19	11	0	+ 7		—		...
Riverview		—	48·1	154		—		...	? 19	18	24	+29
Kodaikanal	E.	M.	49·8	276	19	10	42	−24		—		...
Simla		O.E.	52·1	303	? 19	11	0	−21		—		...
Bombay	E.	M.	54·3	287	19	11	12	+23		—		...
Tashkent		G.	60·8	313	19	12	35	+17	19	20	39	+ 6
Honolulu	E.	M.	71·9	70	19	14	18	+49	19	23	48	+59
Baku		G.	75·1	310	19	13	55	+ 5	19	23	33	+ 6
Tiflis		G.	79·0	311	19	14	28	+15	19	24	13	+ 1
Pulkovo		G.	86·1	330	19	15	7	+13	19	25	24	0
Ksara		Ma.	86·7	304	? 19	15	13	−16		—		...
Beirut	E.	M.	87·1	304	19	20	0	? P.R.		—		...
Czernowitz		Ma.	91·2	319	? 19	14	42	−40	19	26	29	+ 3
Lemberg		B.O.	92·1	321	19	23	20	? P.R.		—		...
Königsberg		W.	92·5	327	19	23	48	? P.R.		—		...
Breslau		W.	95·8	324	19	26	26	? S.	19	26	26	−48
Vienna		W.	97·2	321	19	15	58±	+ 3		—		...
Graz		W.	98·2	321	19	16	30	+29	19	27	30	− 8
Hamburg		—	98·6	328	19	20	0	? P.R.		—		...
Zagreb		W.	98·6	319	? 19	15	54	− 9	? 19	26	48	−54
Laibach		G.	99·2	320	19	16	10	+ 4	19	26	42	−66
Göttingen		W.	99·5	326		—		...	? 19	27	36	−16
Triest		W.	99·8	320		—		...	? 19	26	6	−108
Heidelberg		—	101·5	325	19	26	2	? S.	19	26	2	−128
Florence		A.	102·3	319	19	25	52	? S.	19	25	52	−145
Edinburgh	E.	M.	103·6	334	19	28	18	? S.	19	28	18	−11
Moncalieri		S.	104·0	321	? 19	13	8	−208	? 19	25	49	−164
Eskdalemuir		G.	104·1	334		—		...	19	29	53	+79
Stonyhurst	E.	M.	104·6	332	19	19	30	+178	19	30	24	+106
Paris		—	105·0	326		—		...	? 19	27	16	−86
Bidston	E.	M.	105·1	332	19	28	42	? S.	19	28	42	− 1
Guildford		M.	105·3	330	19	19	54	+199	19	30	24	+99
Shide	E.	M.	105·9	329	19	26	0	? S.	19	26	0	−171
San Fernando	E.	M.	117·4	320	19	33	30	? S.	19	33	30	+181
	N.	M.	117·4	320	19	27	30	? S.	19	27	30	−179

1913. April 20d. 3h. 13m. 37s.

Adopted Origin: 42°·5N. 45°·4E.; Pulkovo, 42°·9N. 45°·8E. or 41°·1N. 43°·8E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Tiflis		G.	0·9	210	3	13	51	0	3	14	1	− 1
Baku		G.	4·0	121	3	14	38	− 1	? 3	15	24	− 3
Ksara-		Ma.	11·4	224	3	16	23	− 4	3	19	12	+31
Czernowitz		Ma.	14·8	300	3	17	6	− 7	3	19	47	−17
Lemberg		B.O.	16·3	—	3	14	48	−165		—		...
Helwan	E.	M.	16·9	227	3	18	0	+19		—		...
	N.	M.	16·9	227	3	21	0	? S.	3	21	0	+ 7
Tashkent		G.	17·8	85	3	18	3	+11	3	21	43	+30
Budapest		W.	19·2	294	? 3	18	5	− 3		—		...
Pulkovo		G.	19·6	337	3	18	18	+ 5	3	21	54	+ 2
							22	+ 9		22	8	+16
Königsberg		W.	20·3	316	3	18	27	+ 5	3	22	24	+18
Vienna		W.	21·0	296	3	18	24	− 6	3	22	20	− 1
Breslau		W.	21·1	304	3	18	27	− 4	3	22	40	+17
Zagreb		W.	21·5	290	? 3	18	30	− 6	3	22	25	− 7
Graz		W.	21·6	293	3	18	29	− 8	3	22	33	− 1
Laibach		G.	22·2	290	3	18	43	− 1	3	22	30	−16
Triest		W.	22·8	289	3	18	39	−13	3	22	46	−12
Pompeii		O.A.	23·0	275	3	19	41	? P.R.	3	22	55	− 7
Padova		V.	24·1	288	3	18	56	−10	3	23	16	− 7
Florence		A.	24·8	285		—		...	3	23	26	−10
Göttingen		W.	25·5	303	3	19	6	−14	3	22	46	−64
Hamburg		—	25·8	308	3	19	21	− 2	3	24	2	+ 7
Heidelberg		—	26·3	298	3	18	49	−39	3	24	1	− 4
Moncalieri		S.	27·1	288	? 3	18	46	−50	3	23	42	−38
Simla		O.E.	27·7	104		—		...	? 3	24	6	−25
Aachen		W.	27·9	301		—		...	? 3	24	30	− 4
Paris		G.	30·2	297		—		...	? 3	25	0	−14
Shide	E.	M.	32·5	301	3	28	0	? S.R.		—		...
West Bromwich		M.	32·9	304	3	26	0	? S.	3	26	0	+ 1
Stonyhurst	E.	M.	33·1	307	3	27	36	? S.R.		—		...
Bidston	E.	M.	33·5	306	3	29	36	? S.R.		—		...
Limerick	E.	—	36·9	305		—		...	? 3	27	6	+ 6
Irkutsk		G.	39·9	55	3	21	37	+ 6	3	27	50	+67

1913. April 24d. 10h. 14m. 53s.

Adopted Origin: 9°·3N. 129°·3E.; Irkutsk, 12°·5N. 128°·0E; Pulkovo, 13°·0N. 128°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	9·7	304	10	17	9	−10		—		...
Zi-ka-wei	N.	W.	23·1	343	10	20	14	+ 3	10	24	17	−3
Osaka		O.	26·0	11	10	20	54	+13	10	25	41	+26
Batavia		W.	27·3	236	10	20	49	− 5		—		...
Tsingtau		W.	28·0	344	10	20	56	− 5	10	25	36	−16
Calcutta	E.	M.	41·4	294	10	20	24	−155		—		...
Irkutsk		G.	47.5	339	10	23	48	+ 4	10	30	25	−16
Riverview		—	47·8	155	10	24	18	+32	10	31	12	+15
Kodaikanal	E.	M.	51·2	277	10	23	6	−61		—		...
Simla		O.E.	53·0	302	? 10	24	3	−16		—		...
Bombay	E.	M.	55·4	287	10	24	0	−15		—		...
Tashkent		G.	61·5	312	10	25	22	+ 7	10	33	30	− 5
Honolulu	E.	M.	70·6	71	10	27	0	+46	10	36	30	+64
Baku		G.	76·0	310	10	26	47	− 1	10	36	14	−16
Mauritius	N.	M.	76·3	246	10	32	0	? P.R.		—		...
Tiflis		G.	79·7	311	10	27	10	0	10	37	3	−10
Pulkovo		G.	86·5	330	10	27	56	+ 7	10	38	18	−11
Czernowitz		Ma.	91·7	320	? 10	26	5	−133	10	38	51	−34
Helwan	E.	M.	92·1	301	10	24	0	−261		—		...
	N.	M.	92·1	301	10	29	0	+39		—		...
Lemberg		B.O.	92·6	321	? 10	31	30	+187	10	31	30	? P.
Königsberg		W.	92·9	327	? 10	31	0	+155	? 10	39	26	−11
Victoria	E.	M.	94·3	39		—		...	? 10	38	42	−70
Breslau		W.	96·3	324	? 10	28	48	+ 4	10	40	0	−12
Vienna		W.	97·8	322	10	29	29	+37	10	40	24	− 3
Graz		W.	98·7	321	10	29	0	+ 3	10	40	24	−12
Hamburg		—	99·0	328	10	30	0	+62		—		...
Zagreb		W.	99·2	321	10	28	54	− 5	10	39	24	−77
Laibach		G.	99·8	320	10	30	18	+75	10	40	21	−26
Göttingen		W.	100·0	327	? 10	29	0	− 4		—		...
Triest		W.	100·5	320		—		...	? 10	39	30	−65
Padova		V.	101·7	320	10	39	49	? S.	10	39	49	−75
Heidelberg		—	101·9	325	? 10	32	0	+169	10	40	45	−22
Aachen		W.	102·6	327		—		...	? 10	40	52	−21
Florence		A.	102·9	319		—		...	10	40	39	−37
Edinburgh	E.	M.	103·9	335	10	40	30	? S.	10	40	30	−55
Eskdalemuir		G.	104·3	334		—		...	10	41	4	−25
Moncalieri		S.	104·6	322	10	28	19	−66	10	41	4	−27
West Bromwich		M.	104·6	332	10	40	0	? S.	10	40	2	−91
Bidston	E.	M.	105·5	333	10	41	36	? S.	10	41	36	− 4
Paris		—	105·5	327	10	26	40	−170	10	41	17	−23
Guildford		M.	105·7	330	? 10	33	54	? P.R.	? 10	44	45	+183
Limerick	E.	—	108·5	335		—		...		—		...
	N.	—	108·5	335		—		...	? 10	40	24	−104
Granada		Bif.	115·9	320	? 10	45	0	? S.	? 10	45	0	+110
San Fernando	E.	M.	118·0	320	10	35	18	? P.R.		—		...
	N.	M.	118·0	320	10	33	0	−153		—		...

1913. April 24d. 12h. 15m. 6s.

Adopted Origin : 9°·3N. 128°·4E.; Pulkovo, 7°·0N. 120°·0E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila	W.	9·0	307	12	17	26	+ 4		—		...
Zi-ka-wei	W.	22·8	344	12	20	19	− 2	12	24	13	−14
Osaka	O.	26·1	13	12	21	12	+17	12	25	44	+14
Batavia	W.	26·5	235	12	20	52	− 7	12	25	17	−21
Tsingtau	W.	27·7	346	12	21	7	− 4	12	25	43	−17
Irkutsk	G.	47·2	340	12	23	47	− 7	12	30	34	−16
Colombo E.	M.	48·2	273	12	31	36	? S.	12	31	36	+34
Riverview	W.	48·3	154	12	24	18	+16	12	31	14	+10
Kodaikanal E.	M.	50·2	276	12	35	24	? S.R.		—		...
Bombay E.	M.	54·6	287	12	31	42	? S.	12	31	42	−40
Tashkent	G.	60·9	312	12	25	30	+ 6	12	33	36	− 5
Honolulu E.	M.	71·4	70	12	27	36	+64	12	36	36	+47
Baku	G.	75·3	310	? 12	26	44	−13	12	36	19	−16
Tiflis	G.	79·1	311	12	27	24	+ 4	12	37	6	−13
Pulkovo	G.	86·0	330	12	27	58	− 1	12	38	23	−13
Czernowitz	Ma.	91·1	319	? 12	25	53	−155	12	39	12	−19
Lemberg	B.O.	92·1	321	12	26	48	−105		—		...
Königsberg	W.	92·4	325		—		...	? 12	39	26	−19
Breslau	W.	95·7	321	12	29	29	+36		—		...
Vienna	W.	97·2	318		—		...	12	40	12	−22
Graz	W.	98·2	317	12	28	48	−19	12	39	29	−75
Hamburg	—	98·5	328		—		...	? 12	39	38	−69
Zagreb	W.	98·6	316	12	29	0	− 9	12	40	0	−48
Laibach	G.	99·2	316		—		...	? 12	40	30	−24
Göttingen	W.	99·5	326		—		...	? 12	39	40	−77
Padova	V.	101·2	306	12	39	0	? S.	12	39	0	−133
Eskdalemuir	G.	103·8	334		—		...	? 12	41	21	−16
Moncalieri	S.	104·0	321	? 12	39	52	? S.	? 12	39	52	−107
Paris	—	105·0	326		—		...	? 12	40	10	−98
West Bromwich	M.	105·0	331	12	39	30	? S.	12	39	30	−168
Guildford	M.	105·2	330	? 12	31	18	+97	? 12	41	3	−46

1913. April 25d. 17h. 56m. 8s.

Adopted Origin: 9°·5N. 128°·8E.;

Irkutsk, 9°·4N. 127°·5E.; Pulkovo, 15°·7N. 134°·6E. or 11°·3N. 125°·3E.; Eskdalemuir, 21°·0N. 114°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Manila		W.	9·2	305	17	58	32	+ 5		—		...
Zi-ka-wei	E.	W.	23·5	344	18	1	36	+ 5	18	5	32	—11
	N.	W.	23·5	344	18	1	28	— 3	18	5	40	— 3
Osaka		O.	25·9	12	18	2	22	+27		—		...
Batavia		W.	27·0	235	18	2	0	— 6	18	6	45	— 4
Tsingtau		W.	27·7	345	18	2	20	+ 7	18	7	0	— 2
Calcutta	E.	M.	40·9	294	18	4	12	+ 2		—		...
Perth	E.	M.	43·2	196	18	4	42	+14		—		...
Irkutsk		G.	47·2	340	18	4	54	— 2	18	11	49	— 3
Riverview		W.	48·2	155	18	5	18	+15	18	12	22	+18
Sydney	E.	M.	48·3	155	18	5	12	+ 8	18	11	30	—36
Colombo	E.	M.	48·5	270	18	4	30	—35		—		...
Kodaikanal	E.	M.	50·6	276	18	6	42	+83		—		...
Simla		O.E.	52·5	302	? 18	5	6	—25		—		...
Bombay	E.	M.	54·9	287	18	6	0	+14		—		...
Tashkent		G.	61·0	312	18	6	36	+ 9	18	14	54	+10
Honolulu	E.	M.	71·0	71	18	8	12	+41	18	17	18	+32
Baku		G.	75·5	309	18	8	0	0	18	17	37	— 3
Mauritius	E.	M.	75·7	246	18	8	18	+17	18	17	24	—18
	N.	M.	75·7	246	18	7	12	+49		—		...
Tiflis		G.	79·2	311	18	8	24	+ 2	18	18	24	+ 2
Pulkovo		G.	86·0	330	18	9	5	+ 4	18	19	39	— 8
							12	+ 8			36	— 2
							23	+22			43	— 5
Ksara		Ma.	87·1	304	18	9	23	+15		—		...
Beirut	E.	M.	87·4	304	18	11	30	+141		—		...
Czernowitz	E.	Ma.	91·3	320	? 18	9	42	+11		—		...
	N.	Ma.	91·3	320	18	9	45	+14	18	20	27	— 8
Helwan	E.	M.	91·6	301	18	9	30	— 3		—		...
	N.	M.	91·6	301	18	9	36	+ 3	18	21	6	+27
Lemberg		B.O.	92·2	321	18	9	30	— 6	18	20	14	—31
Königsberg		W.	92·5	327	18	10	4	+26	18	20	14	—34
Victoria	E.	M.	94·4	39	18	10	0	+12		—		...
Breslau		W.	95·8	324	18	9	57	+ 1	18	21	20	— 2
Budapest		W.	95·9	320	18	10	7	+15	18	21	20	— 3
Vienna		W.	97·3	322	18	9	58±	— 6	18	20	43	—54
Sarajevo		W.	97·6	317	18	9	54	—12	18	21	24	—16
Graz		W.	98·3	321	18	10	11	+ 1	18	20	46	—61
Hamburg		—	98·5	328	18	10	20	+ 9	18	20	53	—56
Zagreb		W.	98·6	320	18	10	12	+ 1		—		...
Laibach		G.	99·3	320	18	10	14	— 1	18	20	52	—65
Göttingen		W.	99·5	327	18	10	15	— 1	18	20	57	—62
Triest		W.	100·0	320	18	13	30	? P.R.	18	20	53	—71
Pola		W.	100·3	319		—		...	18	20	48	—79
Padova		V.	101·2	320	18	10	20	— 4	18	20	57	—78
Pompeii	E.	O.A.	101·5	315	? 18	11	0	+34		—		...
Heidelberg		—	101·5	325	18	10	39	+13	18	19	6	—192
Aachen		W.	102·1	327	18	10	30	+ 1	18	21	8	—76
Florence	N.	A.	102·4	319		—		...	18	21	9	—78
Edinburgh	E.	M.	103·4	335	18	14	36	? P.R.		—		...
Eskdalemuir		G.	103·8	334	18	10	36	— 1	18	21	20	—67
Paisley	E.	M.	104·0	335	18	20	0	? S.	18	20	0	—161
Moncalieri		S.	104·1	321	18	10	51	+13	18	21	11	—91
Stonyhurst	E.	M.	104·5	333		—		...	18	21	0	—106
Kew	E.	M.	104·9	330	18	15	0	? P.R.		—		...
Paris		—	105·0	327	18	10	52	+10	18	21	24	—86
Bidston	E.	M.	105·0	333	18	15	6	? P.R.	18	21	36	—74
West Bromwich	E.	M.	105·1	331		—		...	18	21	0	—111
Guildford		M.	105·2	330	18	10	6	—37	18	21	0	—112
Haslemere	E.	M.	105·4	330	18	22	12	? S.	18	22	12	—42
Shide	E.	M.	105·9	330		—		...	18	21	30	—89
Limerick	E.	—	108·1	334	18	15	48	? P.R.		—		...
Cape Town	E.	M.	112·1	237	18	21	30	? S.	18	21	30	—146
Granada		Bif.	115·4	319	? 18	17	12	? P.R.	? 18	25	52	+91
San Fernando	E.	M.	117·5	320	18	16	30	? P.R.		—		...
St. Louis		W.	119·8	35		—		...	? 18	23	42	—74
Ottawa		B.	120·8	20	18	17	34	? P.R.	? 18	24	36	—27
Toronto	E.	M.	121·0	23	18	18	0	? P.R.		—		...
Harvard University		B.O.	125·0	18	? 18	18	37	? P.R.		—		...
Azores	E.	M.	127·1	335	18	22	12	? S.	18	22	12	—217

1913. April 26d. {4h. 5m. 55s. first 'quake.
4h. 21m. 5s. second ,,

Adopted Origin: 9°·5N. 126°·3E.; double 'quake;

Pulkovo, 12°·0N. 127°·0E., 12°·0N. 127°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
				4H.	5M.	55S.						
Manila		W.	7·3	315	4	8	10	+24		—		...
Zi-ka-wei		W.	22·2	349	4	11	4	+ 2	4	15	10	+ 6
Batavia		W.	25·0	232	4	11	33	0	4	13	34	−134
Osaka		O.	26·5	17	4	11	46	− 2	4	16	27	0
Tsingtau		W.	27·1	349	4	11	53	− 1	4	16	27	−11
Calcutta	E.	M.	38·6	294	4	13	48	+10		—		...
Colombo	E.	M.	46·1	268	4	15	30	+54		—		...
Irkutsk		G.	46·4	342	4	14	34	− 4	4	21	21	− 7
Kodaikanal	E.	M.	48·1	276	4	17	48	? P.R.		—		...
Sydney	E.	M.	49·4	153	4	12	30	−138	4	22	0	− 6
Riverview		—	49·4	153	4	16	19	? P.R.		--		...
Bombay	E.	M.	52·5	285	4	27	6	? S.R.		—		...
Tashkent		G.	59·2	313	4	16	12	+11	4	24	21	+13
Honolulu	E.	M.	73·3	70	4	26	24	? S.	4	26	24	−37
Baku		G.	73·5	309	4	17	36	+ 2	4	27	6	+ 3
Tiflis		G.	77·4	311	4	17	55	− 3	4	28	52	+64
Pulkovo		G.	84·9	330	4	18	44	+ 2	4	29	7	− 6
Beirut	E.	M.	85·4	304	4	24	30	? P.R.		—		...
Helwan	N.	M.	89·5	300	4	22	0	? P.R.		—		...
Czernowitz		Ma.	89·7	319	? 4	29	55	? S.	4	29	55	−10
Graz		W.	96·8	320		—		...	? 4	33	30	+131
Zagreb		W.	97·1	319	4	24	0	? P.R.		—		...
Hamburg		W.	97·3	328	4	23	0	? P.R.		—		...
Heidelberg		—	100·1	324	4	23	30	? P.R.		—		...
Aachen		W.	100·3	326		—		...	4	30	0	−114
Moncalieri		S.	102·5	321	4	31	48	? S.	4	31	48	−27
Paris		G.	103·7	326	4	31	12	? S.	4	31	12	−73
				4H.	21M.	5S.						
Manila		W.	7·3	315	4	23	18	+22		—		...
Zi-ka-wei		W.	22·2	349	4	26	14	+ 2	4	29	58	−16
Batavia		W.	25·0	232	4	31	0	? S.	4	31	0	− 8
Osaka		O.	26·5	17	4	27	43	+45	4	32	14	+37
Colombo	E.	M.	46·1	268		—		...	4	34	30	−124
Mauritius	E.	M.	73·4	246	4	41	30	? S.	4	41	30	−42
Pulkovo		G.	84·9	330	4	33	50	− 2	4	44	16	− 7
Czernowitz		Ma.	89·7	319		—		...	? 4	45	5	−10
Königsberg		W.	91·1	326		—		...	? 4	45	12	−18
Vienna		W.	95·8	321	4	35	8	+15	? 4	43	30	−169
Florence		A.	100·8	318	4	48	38	? S.	4	48	38	+90
Edinburgh	E.	M.	102·4	334	4	48	54	? S.	4	48	54	+90
Stonyhurst	E.	M.	103·4	332	4	34	30	−62	4	46	12	−81
Paris		G.	103·7	326		—		...	4	45	57	−98
Bidston	E.	M.	103·9	332	4	34	18	−77	4	45	42	−115

1913. April 28d. 18h. 39m. 14s.

Adopted Origin: 10°·0N. 127°·5E.; Irkutsk, 10°·9N. 125°·9E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. s.	S. H.	M.	S.	O−C. s.
Manila		W.	7·9	307	18	41	18	+ 4		—		...
Zi-ka-wei	E.	W.	21·9	346		—		...	18	48	24	+ 7
	N.	W.	21·9	346	18	44	22	+ 4	18	48	28	+11
Osaka		O.	25·7	15	18	45	41	+42	18	49	42	+12
Batavia		W.	26·3	232	18	46	56	+111	18	49	23	−19
Calcutta	E.	M.	39·5	293	18	48	54	+49		—		...
Irkutsk		G.	46·3	341	18	47	51	− 3	18	54	37	− 9
Colombo	E.	M.	47·3	267	18	55	0	? S.	18	55	0	+ 1
Sydney	E.	M.	49·3	154	18	55	18	? S.	18	55	18	− 6
Riverview		—	49·3	154	18	48	18	+ 2	18	55	21	− 3
Bombay	E.	M.	53·6	286	18	55	18	? S.	18	55	18	−60
Honolulu	E.	M.	72·0	71	19	0	30	? S.	19	0	30	+26
Baku		G.	74·2	309	18	50	51	− 6	19	0	20	−10
Tiflis		G.	78·0	311	18	51	15	− 6	19	0	5	−69
Pulkovo		G.	85·0	330	18	52	0	− 2	19	2	19	−14
							3	+ 1			24	− 9
Ksara		Ma.	85·8	304	18	52	0	− 6	19	2	28	−14
Czernowitz		Ma.	90·1	319	19	2	53	? S.	19	2	53	−36
Helwan	E.	M.	90·3	300	19	1	0	? S.	19	1	0	−151
	N.	M.	90·3	300	19	3	0	? S.	19	3	0	−31
Vienna		W.	96·1	321	? 18	53	36	+32	19	3	36	−55
Graz		W.	97·1	321		—		...	? 19	2	43	−118
Zagreb		W.	97·5	329		—		...	19	3	36	−69
Hamburg		—	97·5	328		—		...	? 19	3	38	−67
Laibach		G.	98·2	320	? 18	56	36	? P.R.	? 19	3	17	−95
Göttingen		W.	98·4	326		—		...	? 19	4	28	−26
Triest		W.	98·8	320	? 19	3	39	? S.	19	3	39	−79
Heidelberg		—	100·4	325		—		...	? 19	3	47	−87
Aachen		W.	101·0	327	? 19	4	55	? S.	19	4	55	−24
Florence		A.	101·2	319	19	4	8	? S.	19	4	8	−73
West Bromwich		M.	102·2	331	19	3	0	? S.	19	3	0	−151
Moncalieri		S.	102·9	321	? 18	59	21	? P.R.		—		...
Guildford		M.	103·6	330	18	55	20	+100	19	6	21	+38

1913. April 29d. 3h. 8m. 2s.

Adopted Origin: 9°·0N. 128°·0E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila	W.	8·9	310	3	10	20	+ 3		—		...
Taihoku	O.	17·2	340	3	12	7	− 2		—		...
Zi-ka-wei	W.	23·0	345	3	13	17	− 2	3	17	26	− 1
	O.	23·0	345	3	13	20	+ 1	3	17	10	−17
Batavia	W.	26·0	235	3	13	47	− 3	3	18	26	+ 2
Osaka	O.	26·6	14	3	14	5	+ 9	3	18	28	− 7
Tsingtau	W.	28·0	347		—		...	3	18	46	−15
Irkutsk	G.	47·4	340	3	16	49	− 3	3	23	32	−16
Riverview	—	48·1	154		—		...	3	24	12	+15
Baku	G.	75·1	310	3	19	50	− 2	3	29	16	−13
Tiflis	G.	79·0	311	? 3	21	0	+45	3	30	1	−13
Pulkovo	G.	86·1	330	3	20	59	+ 3	3	31	21	−12
Czernowitz	Ma.	91·2	319	? 3	21	40	+16	3	32	9	−19
Helwan E.	M.	91·2	301	3	30	0	? S.	3	30	0	−148
Helwan N.	M.	91·2	301	3	31	0	? S.	3	31	0	−88
Vienna	W.	97·2	321	? 3	22	42	+45	? 3	33	6	−24
Graz	W.	98·2	321	? 3	27	0	? P.R.		—		...
Hamburg	—	98·6	328		—		...	3	33	0	−44
Laibach	G.	99·2	320		—		...	3	33	26	−24
Göttingen	W.	99·5	326	3	33	30	? S.	3	33	30	−23
Heidelberg	—	101·5	325		—		...	3	33	43	−29
Aachen	W.	102·1	327	3	33	57	? S.	3	33	57	−21
Moncalieri	S.	104·0	321		—		...	? 3	34	5	−30

1913. April 29-30d. 23h. 28m. 59s.

Adopted Origin: 50°·0N. 171°·0E.; Eskdalemuir, 44°·0N. 177°·0E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Honolulu E.	M.	37·6	128	23	37	18	+44		—		...
Irkutsk	G.	40·4	300	23	36	55	− 2	23	43	14	+ 2
Pulkovo	G.	65·7	340	23	39	51	+ 3	? 23	48	26	− 6
Tashkent	G.	65·9	306	23	40	0	+11	23	48	46	+11
Toronto E.	M.	68·1	47	23	47	12	? S.	23	47	12	−110
Ottawa	B.	68·5	44	? 23	40	13	+ 7	? 23	49	6	− 1
Eskdalemuir	G.	74·6	357	23	40	47	+ 2	23	50	56	+36
Hamburg	—	75·2	348	23	40	49	0		—		...
Baku	G.	75·9	318	23	40	50	− 3	? 23	50	38	+ 3
Bidston E.	M.	76·5	356	23	51	12	? S.	23	51	12	+30
Tiflis	G.	76·9	322	23	40	59	0	23	50	47	0
Göttingen	W.	77·1	348		—		...	? 23	51	24	+35
Czernowitz	Ma.	77·2	337	23	41	3	+ 2	23	50	46	− 4
Limerick	—	77·4	360		—		...	? 23	50	42	−10
Aachen	W.	78·4	350	23	41	0	− 8	? 23	51	53	+49
Guildford	M.	78·5	355	23	40	24	−45	23	50	12	−53
Shide E.	M.	79·1	355	23	39	0	−133		—		...
Vienna	W.	79·4	343	23	41	11	− 3		—		...
Heidelberg	—	79·5	349	? 23	38	0	−195		—		...
Graz	W.	80·6	343	23	41	21	− 1	23	51	30	+ 1
Paris	G.	80·7	352	23	41	48	+26	23	51	22	− 8
Innsbruck	Ma.	81·1	346	23	41	25	+ 1		—		...
Laibach	G.	81·8	344	23	41	23	− 5	23	51	37	− 6
Zagreb	W.	81·8	343	23	41	32	+ 4	23	51	32	− 11
Padova	V.	82·9	345	23	41	31	− 3		—		...
Sarajevo	W.	83·1	340	23	41	36	0		—		...
Moncalieri E.	S.	83·9	348	23	41	36	− 4	23	52	0	− 6
Helwan N.	M.	92·4	326	23	46	0	? P.R.		—		...
San Fernando E.	M.	93·5	358	23	57	0	? S.	23	57	0	+191
San Fernando N.	M.	93·5	358	23	52	30	? S.	23	52	30	− 79

1913. April 30d. 11h. 34m. 23s.

Adopted Origin: 50°·0N. 174°·0W.;

Irkutsk, 53°·7N. 166°·1W.; Pulkovo, 50°·2N. 176°·3E.; Eskdalemuir, 51°·0N. 177°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Honolulu	E.	M.	31·3	151	11	41	18	+14		—		...
Osaka		O.	39·5	273	11	42	15	+ 1	11	48	21	− 2
Tsingtau		W.	48·4	280	11	43	20	+ 1	11	50	19	− 3
Irkutsk		G.	48·5	306	11	43	14	− 6	11	50	28	+ 5
Zi-ka-wei		W.	50·8	275	11	43	44	+ 9	11	51	2	+10
		O.	50·8	275	11	43	39	+ 4	11	50	57	+ 5
St. Louis		W.	57·9	67		—		...	? 11	52	15	− 6
Toronto	E.	M.	60·5	56	11	47	12	? P.R.	? 11	52	24	−29
Ottawa		B.	61·2	52	11	44	49	+ 6	11	53	0	− 1
Manila		W.	62·9	260	11	45	0	+ 6		—		...
Harvard University	N.	B.O.	65·7	52		—		...	? 11	53	48	− 8
Pulkovo		G.	68·5	347	11	45	31	0	11	54	21	−10
Tashkent		G.	73·3	316	11	46	4	+ 3		—		...
Edinburgh	E.	M.	73·8	5	11	55	42	? S.	11	55	42	+ 7
Eskdalemuir		G.	74·4	5	11	46	39	+31	11	56	7	+25
Bidston	E.	M.	76·3	6	11	55	42	? S.	11	55	42	−22
Hamburg		—	76·3	358	11	46	19	− 1		—		...
Limerick	N.	—	76·6	9	11	46	42	+20		—		...
Simla		O.E.	77·4	304		—		...	? 11	56	7	− 9
Göttingen		—	78·3	358	11	46	30	− 2	? 11	56	16	−11
Kew	E.	M.	78·4	4	12	2	6	? S.R.		—		...
Breslau		W.	78·5	353	11	46	32	− 1	11	56	23	− 6
Guildford		M.	78·6	4	11	46	45	+11	11	55	12	−78
Shide	E.	M.	79·1	5	11	47	0	+23		—		...
Czernowitz		Ma.	80·2	347	11	46	41	− 2	11	56	48	0
Heidelberg		—	80·6	359	11	46	50	+ 4	11	56	0	−53
Paris		—	81·1	2	11	46	46	− 3	11	56	46	−13
Vienna		W.	81·3	353	11	46	47	− 3	11	56	54	− 7
Baku		G.	81·8	328	11	46	38	−14	11	57	6	− 1
Budapest		W.	81·9	351	11	46	42	−11		—		...
Tiflis		G.	82·2	332	11	46	56	+ 2	11	56	59	−12
Graz		W.	82·5	353	11	46	53	− 3	11	57	24	+ 9
Innsbruck		Ma.	82·6	356	11	46	56	− 1		—		...
Laibach		G.	83·7	354	11	46	52	−11	11	57	13	−15
Zagreb		W.	83·8	353	11	47	0	− 4	11	57	30	+ 1
Triest		W.	84·1	355	11	46	59	− 7	11	57	24	− 8
Padova		V.	84·4	356	11	47	0	− 7	11	57	22	−13
Moncalieri		S.	85·0	356	11	45	6	−125	11	57	23	−19
Sarajevo		W.	85·5	351	11	47	0	−14		—		...
Florence		A.	86·1	356	11	52	37	? P.R.	11	57	0	−54
Riverview		—	89·4	208	? 11	49	18	+103	? 11	58	12	−18
Bombay	E.	M.	89·6	300	11	59	54	? S.	11	59	54	+81
Rio Tinto	E.	M.	91·5	10	11	58	0	? S.	11	58	0	−53
Beirut	E.	M.	92·1	336	11	57	30	? S.	11	57	30	−89
Ksara	N.	Ma.	92·1	336	11	47	47	− 4	11	58	13	−46
Granada		Bif.	92·4	8	11	47	57	+ 5	? 11	59	13	+11
San Fernando	N.	M.	92·8	10	11	57	30	? S.	11	57	30	−96
	E.	M.	92·8	10	11	58	30	? S.	11	58	30	−36
Kodaikanal	E.	M.	93·8	291	11	58	42	? S.	11	58	42	−35
Adelaide	E.	M.	94·8	217	11	58	48	? S.	11	58	48	−39
Helwan		M.	96·9	338	11	51	0	? P.R.		—		...

1913. May 18d. 2h. 8m. 53s.

Adopted Origin: 14°·5N. 145°·5E.; Pulkovo, 26°·3N. 143°·7E.; Makeyevka, 29°·8N. 156°·2E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Osaka		O.	22·1	337	2	14	2	+ 3	2	18	2	+ 2
Manila		W.	23·8	276	2	14	26	+ 7		—		...
Zi-ka-wei	E.	W.	27·7	311	2	14	51	− 7		—		...
	N.	W.	27·7	311	2	14	53	− 5	2	19	39	− 8
		O.	27·7	311	2	14	54	− 4	2	19	44	− 3
Tsingtau		W.	31·2	318	2	14	21	−72	2	19	54	−53
Batavia		W.	43·6	244	2	17	13	− 3	2	23	42	− 7
Riverview		—	48·6	174	2	17	36	−15	2	24	30	−24
Irkutsk		G.	50·0	328	2	17	57	− 3		—		...
Honolulu	E.	M.	53·9	74	2	18	30	+ 5	2	26	12	+11
Perth	E.	M.	54·4	207	2	23	0	? S.	? 2	23	0	−187
Simla		O.E.	64·2	298	2	19	9	−23	2	28	27	+19
Colombo	E.	M.	64·8	269	2	30	18	? S.	2	30	18	+122
Kodiakanal	E.	M.	66·4	275	2	20	42	+55		—		...
Tashkent		G.	70·2	309	2	20	19	+ 8	2	29	35	+14
Victoria	E.	M.	80·0	42	2	21	6	− 6	? 2	31	18	+ 2
Baku		G.	84·8	310	2	21	27	−13	2	31	57	−13
Pulkovo		G.	89·5	333	2	21	58	− 8	2	31	53	− 9
Tiflis		G.	88·2	313	2	22	54	+55	2	33	20	+33
Makeyevka		G.	90·5	320	? 2	22	7	− 5	2	32	37	−35
Seychelles	E.	M.	91·4	266	2	33	0	? S.	2	33	0	−21
Mauritius	E.	M.	92·7	250	2	31	42	? S.	2	31	42	−113
Königsberg		W.	96·7	332	2	23	24	+38		—		...
Czernowitz		Ma.	97·5	324	2	22	32	−18	2	33	22	−62
Ksara		Ma.	97·5	308		—		...	? 2	33	22	−52
Beirut	E.	M.	97·8	308	2	36	0	? S.	2	36	0	+93
Lemberg		B.O.	98·0	326	2	26	25	? P.R.	2	35	29	+120
Breslau		W.	100·6	330	2	22	40	−26	2	33	24	−94
Budapest		W.	101·8	326	2	24	45	+93		—		...
Hamburg		—	102·0	335	2	22	54	−19	2	33	46	−82
Vienna		W.	102·7	328	2	26	10	? P.R.	2	33	52	−82
Göttingen		—	103·5	333	2	23	9	−12	2	33	51	−91
Graz		W.	103·9	328	2	26	28	? P.R.	2	36	42	+77
Sarajevo		W.	104·3	324	2	27	34	? P.R.	2	33	55	−84
Zagreb		W.	104·6	326		—		...	? 2	33	50	−101
Edinburgh	E.	M.	104·9	342	2	33	54	? S.	2	33	54	−100
Laibach		G.	105·1	327	2	22	14	−75	2	33	48	−108
Paisley	E.	M.	105·3	341	2	30	0	? P.R.		—		...
Eskdalemuir		G.	105·3	342	2	23	10	−19		—		...
Aachen		W.	105·7	335	2	27	37	? P.R.	? 2	33	56	−106
Triest		W.	105·7	327		—		...	? 2	33	54	−108
Innsbruck		Ma.	105·8	330	2	27	34	? P.R.		—		...
Heidelberg		—	105·8	333	2	27	34	? P.R	2	36	39	+56
Pola		W.	106·2	327	2	27	6	? P R.	2	34	0	−107
Stonyhurst	E.	M.	106·4	341	2	28	36	? P.R.		—		...
Padova		V.	106·8	328	2	27	5	? P.R.	2	33	53	−119
Bidston	E.	M.	106·9	341		—		...	2	37	48	+139
West Bromwich		M.	107·4	340	? 2	27	36	? P.R.	2	34	0	−118
Kew	E.	M.	107·6	338	2	37	0	? S.	2	37	0	−61
Guildford		M.	107·9	339	2	22	15	−85	2	34	12	−110
Shide		M.	108·6	339	2	27	0	? P.R.		—		...
Pompeii		O.A.	108·6	323	2	27	0	? P.R.		—		...
Paris		G.	108·7	335	2	27	58	? P.R.	2	34	2	−127
Toronto	E.	M.	108·8	33		—		...	? 2	38	6	+116
Moncalieri		S.	109·3	330	2	28	7	? P.R.	2	37	21	+66
Florence		A.	109·3	327	2	28	32	? P.R.	2	37	0	+45
Limerick	N.	—	109·4	344	2	28	30	? P.R.		—		...
Granada		Bif.	120·7	332	2	28	2	? P.R.	2	40	42	+174
San Fernando	N.	M.	121·9	333	2	41	0	? S.	2	41	0	+184
La Paz		—	147·5	98	2	32	40	? P.R.	2	51	25	? S.R.

1913. May 21d. 13h. 48m. 28s.

Adopted Origin: 8°·5S. 149°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Riverview		—	25·4	176	13	54	18 }	+ 8	13	59	34	+55
							57 }	+47		—		...
Sydney	E.	M.	25·4	176	13	54	24	+14	13	59	24	+45
Manila		W.	36·2	310	13	55	0	−52		—		...
Batavia		W.	41·9	270	13	57	0	+22		—		...
Osaka		O.	45·1	343	13	56	54	− 8	14	3	34	−10
Zi-ka-wei		W.	47·7	328	13	57	13	− 7	14	3	54	−24
Tsingtau		W.	52·1	331	13	56	0	−109		—		...
Honolulu	E.	M.	60·0	59	13	58	42	+ 2	14	6	48	− 3
Irkutsk		G.	71·8	333	14	0	0	+ 3	14	9	19	+ 3
Tashkent		G.	88·0	312	14	1	35	+ 2	14	12	10	−10
Baku		G.	102·5	310	14	2	35	−16		—		...
Helwan	E.	M.	118·1	300	14	7	0	+178		—		...
Graz		W.	125·0	323		—		...	14	17	30	−24
Göttingen		—	125·5	330	14	8	0	? P.R.		—		...
Laibach		G.	126·0	322	14	11	0	? P.R.		—		...
Paris		—	130·9	331	14	11	24	? P.R.		—		...

1913. May 21d. 13h. 55m. 48s.

Adopted Origin: 24°·0N. 135°·0E.; Pulkovo, 24°·7N. 129°·3E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Tashkent	G.	56·6	305	14	5	0	−38		—		...
Baku	G.	71·2	307	14	6	47	−25	14	16	1	−21
Pulkovo	G.	76·4	330	14	7	53	+ 8	14	17	19	−11
Makeyevka	G.	76·8	317	14	7	46	− 2	14	17	16	−19
Hamburg	—	89·1	331	14	9	0	+ 1		—		...
Aachen	W.	92·7	331	14	9	54	+35	14	19	48	−42
Moncalieri	S.	96·0	326	14	9	9	−28	14	22	12	+68

Tiflis gives a P. and an S. (both queried), which cannot be fitted to either 'quake.

1913. May 24-25d. 23h. 24m. 25s.

Adopted Origin: 27°·0s. 72°·0w.; Eskdalemuir, 16°·0s. 61°·0w. Pulkovo, 20°·0s. 72°·0w.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Pilar	E.	M.	8·5	126	23	26	36	+ 3		—		...
La Paz		—	11·1	19	23	27	15	+ 5	23	29	34	+13
Azores	E.	M.	78·0	36	23	41	24	? P.R.		—		...
San Fernando		M.	86·6	47	23	48	0	? S.	23	48	0	−24
Granada		Bif.	90·7	48	23	37	54	+10	23	49	28	+42
Honolulu	E.	M.	96·2	291	23	49	36	? S.	23	49	36	− 7
Limerick	E.	—	96·8	33		—		...	23	49	42	− 7
	N.	—	96·8	33		—		...	23	49	24	−25
Shide		M.	99·5	37	23	49	0	? S.	23	49	0	−76
Bidston	E.	M.	100·0	34	23	49	12	? S.	23	49	12	−69
West Bromwich		M.	100·1	36	23	46	0	? P.R.		—		...
Guildford		M.	100·2	37	23	39	11	+34	23	49	13	−70
Kew	E.	M.	100·4	37	23	49	54	? S.		—		...
Stonyhurst	E.	M.	100·5	34	23	50	24	? S.	23	50	24	− 1
Paris		—	100·6	40	23	38	35	− 3	23	49	13	−73
Paisley	E.	M.	100·6	32		—		...	23	49	0	−86
Eskdalemuir		G.	100·9	33	23	38	38	− 2	23	49	18	−71
Edinburgh	E.	M.	101·2	32	23	50	30	? S.	23	50	30	− 2
Moncalieri		S.	102·0	45	23	38	48	+ 3	23	49	43	−57
Aachen		W.	103·6	40	? 23	43	0	? P.R.	? 23	52	12	+78
Florence		A.	103·8	48		—		...	23	52	0	+61
Heidelberg		—	104·3	41		—		...	? 23	49	36	−85
Pompeii		O.A.	104·8	52	23	43	0	? P.R.		—		...
Padova		V.	104·9	46	23	42	6	? P.R.	23	52	3	+57
Göttingen		—	106·1	40		—		...	? 23	49	44	−27
Triest		W.	106·1	47	23	43	34	? P.R.	23	49	48	−90
Laibach		G.	106·8	46	23	38	58	−10	23	49	35	−109
Hamburg		—	106·9	38		—		...	? 23	49	42	−103
Zagreb		W.	107·6	47	23	42	30	? P.R.	23	50	8	−83
Graz		W.	107·7	46	23	42	48	? P.R.	23	53	10	+98
Vienna		W.	108·7	45	23	43	36	? P.R.	23	52	54	+73
Breslau		W.	110·1	42	23	43	30	? P.R.	23	53	12	+78
Mauritius	E.	M.	112·3	129	23	53	42	? S.	23	53	42	+88
	N.	M.	112·3	129	22	53	24	? S.	23	53	24	+70
Königsberg		W.	113·1	39		—		...	? 23	50	36	−104
Lemberg		B.O.	113·8	45	? 23	37	42	−118	23	53	57	+92
Helwan	E.	M.	113·8	67	23	41	0	+80	23	49	30	−175
	N.	M.	113·8	67	23	41	0	+80	23	49	48	−157
Czernowitz		Ma.	114·9	47	23	44	43	? P.R.	23	53	58	+84
Pulkovo		G.	118·4	34	23	40	1	0		—		−19
Ksara		Ma.	118·7	64	23	44	52	? P.R.	23	52	43	...
Makeyevka		G.	122·8	48	23	45	16	? P.R.	23	55	12	+97
Tiflis		G.	127·0	57	23	47	46	? P.R.		—		...
Baku		G.	130·8	59	23	43	58	+82	? 23	56	37	+126
Batavia		W.	146·8	178	23	44	47	+164		—		...
Irkutsk		G.	154·6	5	23	44	50	...	? 0	0	52	...

1913. May 29d. 13h. 28m. 31s.

Adopted Origin: 19°·0N. 127°·0E.; Irkutsk, 22°·6N. 128°·1E.; Pulkovo, 22°·7N. 128°·3E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Manila		W.	7·3	233	13	30	11	—11		—		...
Zi-ka-wei		W.	13·2	339	13	32	8	+21		—		...
Osaka		O.	17·3	24	13	33	49	+69		—		...
Tsingtau		W.	18·0	342	13	32	14	—34	13	35	41	—30
Batavia		W.	32·1	220	13	35	10	— 9		—		...
Irkutsk		G.	37·7	337	13	36	6	— 1	13	41	46	—19
Simla		O.E.	46·3	295	13	37	6	— 7		—		...
Colombo	E.	M.	47·4	262	13	44	30	? S.	13	44	30	+13
Bombay	E.	M.	51·1	280	13	43	12	? S.	13	43	12	—111
Tashkent		G.	53·5	308	13	38	0	— 1	13	45	9	—25
Baku		G.	68·2	307	13	39	26	—10	? 13	48	6	—29
Honolulu	E.	M.	69·7	74	13	50	6	? S.	13	50	6	+73
Makeyevka		G.	75·3	316	13	40	27	+ 5	13	49	47	—13
Pulkovo		G.	76·9	329	13	40	44	+13	13	50	17	— 2
Ksara		Ma.	80·4	303	? 13	42	0	+172		—		...
Czernowitz		Ma.	82·9	319	? 13	42	54	+108	13	51	12	—15
Königsberg		W.	83·6	326	13	41	20	+ 9	13	51	24	—11
Breslau		W.	87·1	324	13	41	25	— 6	13	51	42	—42
Vienna		W.	88·8	321	13	41	45	+ 5	13	52	12	—20
Hamburg		—	89·6	328	13	41	53	+ 8	13	52	19	—22
Graz		W.	89·8	321	13	41	48	+ 2	13	52	16	—27
Zagreb		W.	90·3	319	13	41	49	0	13	52	15	—33
Göttingen		—	90·7	326		—		...	? 13	52	25	—27
Laibach		G.	90·9	320	13	42	6	+14	13	52	12	—42
Triest		W.	91·6	320	13	52	24	? S.	13	52	24	—38
Heidelberg		—	92·7	325	13	55	36	? S.R.		—		...
Padova		V.	92·8	320	13	42	6	+ 4	13	52	36	—38
Aachen		W.	93·1	327	13	46	0	? P.R.	? 13	52	36	—41
Pompeii	E.	O.A.	93·5	315	13	51	0	? S.	13	51	0	—142
	N.	O.A.	93·5	315	13	52	30	? S.	13	52	30	—52
Florence		A.	94·0	319	13	45	28	? P.R.	13	50	0	—207
Edinburgh	E.	M.	94·2	335	13	53	0	? S.	13	53	0	—29
Eskdalemuir		G.	94·5	334		—		...	13	52	50	—42
Paisley	E.	M.	94·7	335	13	50	0	? S.	13	50	0	—214
Stonyhurst	E.	M.	95·2	333	13	53	30	? S.	13	53	30	— 9
Moncalieri		S.	95·6	322	13	40	56	—82	13	52	56	—47
Paris		—	96·1	327		—		...	13	52	56	—42
Guildford		M.	96·1	330	13	53	3	? S.	13	53	3	—45
Shide	E.	M.	96·8	330	13	52	0	? S.	13	52	0	—115
Limerick		—	98·7	335		—		...	? 13	58	0	+226

NOTE: Osaka gives iP.S. at 13-33-49.

1913. May 30d. 11h. 46m. 46s.

Adopted Origin: 5°·0s. 154°·0E.; Irkutsk, 1°·0N. 159°·6E.; Pulkovo, 6°·0s. 154°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Sydney	E.	M.	29·0	185	11	53	54	+50	11	58	18	+15
Riverview		—	29·0	185	11	53	12	+ 8	11	58	2	− 1
Adelaide	E.	M.	33·2	203	11	53	48	+ 4	11	58	48	−25
Manila		W.	38·1	301	11	54	30	+ 5	12	0	32	+ 7
Osaka		O.	43·3	338	11	55	15	+ 9	12	1	23	−16
Batavia		W.	46·9	267	11	55	40	+ 8	? 11	58	20	? P.R.
Zi-ka-wei		W.	47·7	321	11	55	38	0	12	1	26	−70
		O.	47·7	321	11	55	35	− 3	12	1	42	−54
Tsingtau		W.	51·8	325	11	55	9	−56	12	2	28	−59
Irkutsk		G.	71·0	330	11	58	13	+ 4	12	7	24	0
Colombo	E.	M.	75·0	277	11	59	48	+73	12	8	30	+18
Kodiakanal	E.	M.	77·8	282	11	59	42	+50		—		...
Simla		O.E.	81·3	303	11	59	54	+41	12	9	18	− 6
Bombay	E.	M.	83·3	290	11	56	18	+186		—		...
Victoria	E.	M.	88·9	41	12	6	48	? P.R.		—		...
Tashkent		G.	89·3	312	11	59	59	+ 1	? 12	10	33	−19
Mauritius	N.	M.	93·9	249	12	11	54	? S.	12	11	54	+13
Seychelles	E.	M.	98·4	265	12	12	0	? S.	12	12	0	−26
Baku		G.	103·9	310	12	1	10	− 6	12	14	18	+60
Pulkovo		G.	110·7	333	12	1	47	0	12	14	22	+ 2
Makeyevka		G.	110·9	320	12	1	36	−12	12	15	40	+78
St. Louis	E.	W.	113·3	50	? 12	2	35	+36		—		...
	N.	W.	113·3	50	? 12	2	42	+43		—		...
Ksara		Ma.	116·0	305	12	6	40	? P.R.		—		...
Beirut	E.	M.	116·3	306	12	5	0	? P.R.		—		...
Königsberg		W.	117·7	332	12	5	48	? P.R.	12	14	20	−58
Czernowitz		Ma.	118·2	324	12	6	30	? P.R.	12	16	49	+87
Lemberg		B.O.	118·8	325	12	7	8	? P.R.		—		...
Toronto	E.	M.	119·4	42	12	9	42	? P.R.		—		...
Helwan	E.	M.	120·6	302	12	1	12	−79	12	7	18	? P.R.
Ottawa		B.	121·0	39	? 12	8	0	? P.R.	? 12	17	38	+115
Breslau		W.	121·7	330	12	6	15	+218	12	17	38	+110
Budapest		W.	122·7	325	12	7	21	? P.R.		—		...
Cape Town	E.	M.	122·8	223	12	17	30	? S.	12	17	30	+94
Hamburg		—	123·3	335	12	6	10	+206	? 12	17	39	+99
Vienna		W.	123·7	327	12	6	4	+198	12	17	58	+115
Göttingen		—	124·7	334	12	7	58	? P.R.	? 12	16	49	+39
Graz		W.	124·9	327	12	6	9	+197	12	17	58	+107
Sarajevo	E.	W.	125·0	322	12	6	4	+192	12	17	28	+72
Harvard University		B.O.	125·3	40	12	9	32	? P.R.	12	18	12	+118
Zagreb		W.	125·5	325	12	6	8	+194	12	17	52	+96
Edinburgh	E.	M.	125·9	344	12	8	18	? P.R.		—		...
Laibach		G.	126·0	326	12	6	8	+192	12	18	11	+112
Paisley	E.	M.	126·3	345	12	12	0	...		—		...
Eskdalemuir		G.	126·5	344	? 12	8	18	? P.R.	? 12	21	8	? S.R.
Triest		W.	126·7	326	12	8	18	? P.R.	12	18	13	+109
Innsbruck		Ma.	127·0	329	12	6	15	+195	12	14	0	−146
Heidelberg		—	127·0	333	12	6	42	+222	? 12	19	48	+202
Pola		W.	127·2	325	12	9	33	? P.R.		—		...
Stonyhurst	E.	M.	127·6	343	12	13	30	? S.	12	13	30	−180
Padova		V.	127·9	327	12	6	9	+185	12	15	17	−75
Aachen		W.	127·9	335	12	8	12	? P.R.	? 12	15	24	−68
Bidston	E.	M.	128·1	343	12	9	0	? P.R.	12	14	12	−142
West Bromwich		M.	128·5	342	12	8	0	? P.R.		—		...
Pilar	E.	M.	128·6	138	12	9	48	? P.R.		—		...
Kew	E.	M.	128·9	340	12	8	42	? P.R.		—		...
Pompeii		O.A.	129·1	319	12	6	50	+220		—		...
Guildford		M.	129·1	340	12	1	20	−110	12	14	12	−149
Florence		A.	129·2	326	12	8	27	? P.R.		—		...
Haslemere	E.	M.	129·3	340	? 12	10	24	? P.R.		—		...
Shide	E.	M.	129·8	340	12	3	0	−13		—		...
Paris		—	130·0	336	12	8	31	? P.R.	? 12	15	37	−70
Limerick		—	130·3	346	12	9	6	? P.R.		—		...
Moncalieri		S.	130·4	329	12	6	29	+193	12	17	18	+29
La Paz		—	133·2	118	12	6	39	+191		—		...
Granada		Bif.	141·9	331	? 12	4	57	+52	12	16	31	−89
Rio Tinto	E.	M.	142·8	334	12	17	0	? S.	12	17	0	−66
San Fernando		M.	143·7	333	12	9	12	? P.R.		—		...
Azores	E.	M.	147·3	360	12	7	42	+196		—		...

1913. June 4d. 9h. 57m. 15s.

Adopted Origin: 3°·0s. 149°·0E.; Irkutsk, 1°·1s. 148°·8E. Pulkovo, 17°·0N. 144°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Sydney	E.	M.	30·9	176	10	3	42	−10	10	8	54	−10
Riverview		—	30·9	176	10	3	51	− 1	10	9	0	− 4
Manila		W.	32·8	303	10	3	30	−39	10	7	20	−136
Adelaide	E.	M.	33·4	196	10	5	0	?P.R.	10	8	48	−57
Osaka		O.	39·8	342	10	4	47	−21	10	10	43	−36
Batavia		W.	42·2	264	10	4	32	−55	10	6	44	?P.R.
Perth	E.	M.	42·4	224	10	4	42	−47		—		...
Zi-ka-wei		W.	43·1	324	10	4	46	−48	10	10	46	−78
							59	−35		—		...
		O.	43·1	324	10	5	0	−34	10	11	6	−58
Tsingtau		W.	47·4	328	10	4	38	−87	10	11	16	−105
Honolulu	E.	M.	57·2	62	10	7	48	+40	10	16	6	+62
Irkutsk		G.	66·9	332	10	7	59	−13	10	16	39	−25
Colombo	E.	M.	69·8	279	10	15	30	? S.		—		−129
Kodaikanal	E.	M.	72·4	282	10	17	42	? S.		—		−28
Tashkent		G.	84·3	312	10	9	37	−22	10	19	46	−40
Mauritius	E.	M.	90·0	250	10	19	18	? S.	10	19	18	−131
Victoria	E.	M.	90·7	42	10	21	12	? S.	10	21	12	−24
Tiflis		G.	102·6	312	10	11	2	−36	10	21	43	−112
Pulkovo		G.	106·7	332	10	11	28	−30	10	22	9	−124
Czernowitz		Ma.	113·6	322	10	16	0	?P.R.	10	26	0	+46
Lemberg		B.O.	114·3	324	10	9	30	−182		—		...
Helwan	E.	M.	115·3	302	10	12	0	−38		—		...
Breslau		W.	117·4	328	10	17	42	?P.R.		—		...
Budapest		W.	118·2	324	10	17	13	?P.R.		—		...
Vienna		W.	119·3	326	10	17	12	?P.R.	? 10	26	12	+13
Hamburg		—	119·3	333	10	16	38	+224		—		...
Graz		W.	120·5	325	10	17	30	?P.R.	10	27	7	+59
Göttingen		—	120·7	332	10	16	15	+194	? 10	27	16	+66
Zagreb		W.	121·0	324	10	17	19	?P.R.	10	25	9	−63
Toronto	E.	M.	121·0	39	10	25	0	? S.		—		−72
Laibach		G.	121·6	324	10	23	12	? S.		—		−184
Triest		W.	122·2	324	10	17	36	?P.R.		—		...
Ottawa		B.	122·4	36		—		...	? 10	30	37	?S.R.
Edinburgh	E.	M.	122·6	342	10	25	12	? S.		—		−72
Heidelberg		—	122·8	331	10	16	0	+169		—		...
Paisley	E.	M.	123·0	342	10	23	0	? S.		—		−207
Aachen		W.	123·0	333	10	17	48	?P.R	10	27	48	+81
Padova		V.	123·4	325	10	16	1	+167	10	25	53	−37
Stonyhurst	E.	M.	124·1	340	10	26	0	? S.		—		−35
Bidston	E.	M.	124·6	340	10	24	0	? S.		—		−158
Florence		A.	124·7	324	10	11	0	−140		—		...
West Bromwich		M.	124·9	339	10	16	0	+159		—		...
Kew	E.	M.	125·2	337	10	23	6	? S.		—		−216
Haslemere	E.	M.	125·6	337	10	31	20	?S.R.		—		...
Paris		—	126·0	333	10	18	14	?P.R.		—		...
Moncalieri		S.	126·0	327	10	16	44	+199	10	29	42	+174
Shide		M.	126·1	337	10	23	0	? S.		—		−229
Limerick	E.	—	127·0	343	10	17	42	?P.R.		—		...
Pilar	E.	M.	133·4	140	10	17	0	+182		—		...
Granada	E.N.E.	Bif.	137·6	327	10	14	0	−16	10	26	53	−72
La Paz		—	138·4	119	10	17	30	+190		—		...

1913. June 14d. 8h. 36m. 53s.

Adopted Origin: 20°·0N. 99°·0W.; Granada, 20°·0N. 99°·0W.; Pulkovo, 25°·7N. 99°·8W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Toronto	E.	M.	28·8	30	8	46	0	? P.R.	8	51	42	? S.R.
Ottawa		B.	31·8	32	8	43	43	+ 5	8	49	15	+17
Harvard University		B.O.	32·4	40	8	43	40	− 4	8	49	2	−15
Victoria	E.	M.	34·5	331	8	50	54	? S.	8	50	54	+73
La Paz		—	47·4	138	8	44	52	−51	8	49	12	−207
Honolulu	E.	M.	54·9	282	8	55	12	? S.	8	55	12	+59
Pilar	E.	M.	61·7	146	8	52	24	? S.	8	52	24	−193
Limerick		—	74·4	39	8	48	48	+10		—		...
		—	74·4	39	8	58	48	? S.	8	58	48	+36
Paisley	E.	M.	76·0	35	8	50	42	+114		—		...
Edinburgh	E.	M.	76·7	35	8	59	6	? S.	8	59	6	+28
Eskdalemuir		G.	76·8	36	8	49	5	+12	8	59	2	+22
Bidston	E.	M.	77·5	37	8	59	0	? S.	8	59	0	+12
Stonyhurst	E.	M.	77·7	37	9	0	12	? S.	9	0	12	+82
West Bromwich		M.	78·4	38	8	58	0	? S.	8	58	0	−58
Shide	N.	M.	79·3	40	8	59	0	? S.	8	59	0	− 8
Kew	E.	M.	79·7	39	8	59	42	? S.	8	59	42	+29
Granada		Bif.	82·1	53	8	49	23	− 1	8	59	46	+ 6
Paris		—	82·3	41	8	49	27	+ 2	8	59	50	+ 8
Aachen		W.	83·6	38	8	49	37	+ 4	9	0	30	+33
Hamburg		—	84·6	34	8	49	40	+ 1	9	0	9	+ 1
Heidelberg		—	85·6	39	8	49	44	0	? 9	0	3	−16
Moncalieri		S.	87·1	43	8	49	52	− 1	9	0	10	−25
Padova		V.	89·5	41	8	50	0	− 6		—		...
Pulkovo		G.	90·2	23	8	50	11	+ 1	9	0	45	−24
Triest		W.	90·5	40	9	0	48	? S.	9	0	48	−24
Graz		W.	90·8	38	8	50	45	+32	9	0	52	−23
Vienna		W.	90·8	37	8	50	10	− 3	9	0	46	−29
Zagreb		W.	91·6	39	8	50	14	− 4	9	0	49	−35
Sarajevo	N.	W.	94·3	40	8	50	27	− 6	9	0	33	−79
Makeyevka		G.	101·9	28	8	51	0	−13	9	1	43	−84
Irkutsk		G.	104·9	346	8	56	3	? P.R.		—		...
Tiflis		G.	109·8	28		—		...	9	5	55	+86
Helwan	E.	M.	110·9	45	8	56	36	? P.R.	9	5	12	+43
Baku		G.	113·1	25	8	56	35	? P.R.	9	7	48	? S.R.
Tashkent		G.	117·8	10	8	56	36	? P.R.		—		...
Manila		W.	127·6	308	? 8	55	0	+111		—		...

1913. June 14d. 9h. 33m. 21s.

Adopted Origin: 44°·0N. 25°·0E.; Graz, 42°·2N. 26°·3E. Pulkovo, 43°·5N. 25°·1E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Czernowitz		Ma.	4·4	8	9	34	37	+ 8	9	35	40	+18
							38	+ 9		—		...
Sarajevo	E.	W.	4·7	270	9	34	39	+ 5	9	35	39	+ 9
	N.	W.	4·7	270	9	34	36	+ 2	9	35	30	0
							39	+ 5		—		...
Lemberg	E.	B.O.	5·3	353	9	34	45	+ 2		—		...
	N.	B.O.	5·3	353	9	35	22	? S.	9	35	22	−24
Zagreb		W.	6·9	290	9	35	6	0	9	36	3	−25
											37	+ 9
											48	+20
		W.	6·9	290	9	35	5	− 1	9	36	36	+ 8
											42	+14
Vienna		W.	7·3	308	9	35	18	+ 6	9	37	14	+35
											22	+43
Graz		W.	7·4	299	9	35	18	+ 5	9	37	7	+25
Pola		W.	8·0	279	9	35	23	+ 1	9	37	5	+ 7
							24	+ 2		—		...
Triest		W.	8·0	283	9	35	25	+ 3	9	37	11	+13
Pompeii		O.A.	8·4	251	9	35	25	− 3		—		...
Montecassino		Ca.	8·6	257	9	35	34	+ 3	9	37	15	−25
Padova		V.	9·4	283	9	35	44	+ 1	9	38	58	? S.R.
Florence	E.	A.	9·9	270	9	35	52	+ 2	9	36	56	−51
	N.	A.	9·9	270	9	35	52	+ 2	9	37	8	−29
Makeyevka		G.	9·9	61	9	35	41	− 9		—		...
Innsbruck		Ma.	10·0	293	9	35	54	+ 3	9	38	10	+20
Moncalieri		S.	12·3	279	9	36	27	+ 3	9	39	8	+20
Heidelberg		—	12·6	302	9	36	30	+ 2	9	38	51	− 4
Göttingen		—	12·6	312	9	36	29	+ 1	9	39	9	+14
Ksara	E.	Ma.	13·2	137	9	36	16	−21	9	39	54	+44
	N.	Ma.	13·2	137	9	36	9	−28	9	39	42	+32
Hamburg		—	13·7	320	9	36	45	+ 2	9	39	38	+16
											41	+19
Aachen		W.	14·4	305	9	36	57	+ 5	9	39	58	+19
Tiflis		G.	14·6	90	9	36	41	−14	9	39	28	−15
Pulkovo		G.	16·1	10	9	37	10	− 4	9	40	8	−10
											18	0
Paris		—	16·1	295	9	37	17	+ 3	9	40	22	+ 4
Guildford		M.	18·6	302		—		...	9	41	42	+28
Haslemere	E.	M.	18·6	301		—		...	9	42	12	+58
Baku		G.	18·7	90	9	37	24	−22	9	40	50	−26
Shide	N.	M.	18·9	300	9	38	42	? P.R.		—		...
West Bromwich	E.	M.	19·7	305	9	37	42	−16	9	41	42	+ 4
Stonyhurst	E.	M.	20·3	308		—		...	9	40	0	? P.R.
Granada		Bif.	22·6	263	9	38	26	− 7	9	42	44	+ 6
Limerick		—	23·8	303	9	38	36	−11	9	43	18	+17
San Fernando		M.	24·8	263	9	39	30	? P.R.		—		...
Tashkent		G.	32·3	79	9	40	18	+ 7		—		...
Azores	E.	M.	38·2	278	9	42	0	+59		—		...
Simla		O.E.	42·6	92	9	41	36	0	9	48	18	+14
Bombay	E.	M.	47·0	107	9	43	36	+88		—		...
Irkutsk		G.	50·9	51	9	42	24	− 9	9	49	34	−17
Calcutta	E.	M.	55·6	90	9	50	12	? S.	9	50	12	−38
Kodaikanal	E.	M.	56·3	110	9	50	42	? S.	9	50	42	−17
Harvard University		B.O.	65·9	306	9	44	6	− 5	9	53	8	+11
Ottawa		B.	66·3	311	9	44	18	+ 4	9	53	14	+12
											16	+14
Toronto	E.	M.	69·5	312	9	53	24	? S.	9	53	24	−17
Mauritius	E.	M.	70·8	147	9	51	42	? S.	9	51	42	−135
	N.	M.	70·8	147	9	56	42	? S.	9	56	42	+165
Zi-ka-wei		W.	73·0	63	9	44	44	−13	9	54	4	+41
		O.	73.0	63	9	44	56	− 1	9	54	27	+64
Osaka		O.	79·2	52	9	49	15	? P.R.		—		...
Victoria	E.	M.	83·6	339	9	54	54	? S.	9	54	54	−91
Manila		W.	84·1	75	9	58	0	? S.	9	58	0	+90
Batavia		W.	88·4	100	9	46	21	− 7		—		...
La Paz		—	103·6	260	9	51	31	? P.R.	10	3	37	? S.R.
Pilar	E.	M.	110·7	245	10	6	6	? S.R.		—		...

1913. June 22d. 13h. 49m. 52s.

Adopted Origin: 48°·0N. 178°·0W.;

Pulkovo, 50°·8N. 178°·6E.; Eskdale, 51°·0N. 177°·0E.; Hamburg, 57°.0N. 170°·0W.; Graz, 52°·5N. 164°.5W.; Granada, 52°·0N. 178°·2W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Honolulu	E.	M.	31·1	142	13	56	6	−25	14	2	0	+15
Victoria	E.	M.	35·7	68	13	57	12	+ 1		—		...
Osaka		O.	36·7	268	13	57	29	+ 9	14	3	12	0
Santa Clara	E.	W.	41·6	83	13	58	24	+24	14	4	34	+13
	N.	W.	41·6	83	13	58	35	+35		—		...
Tsingtau		W.	46·0	279	13	57	37	−57	14	4	10	−70
Irkutsk		G.	47·5	306	13	58	35	− 8		—		...
Zi-ka-wei		O.	48·2	271	13	59	8	−39	14	6	3	+15
Manila		W.	59·9	258	14	0	33	+30		—		...
St. Louis		W.	61·2	63	13	59	36	−36	14	7	42	−48
Toronto	E.	M.	63·9	53	14	0	48	+19		—		...
Ottawa		B.	64·6	49	14	0	48	+14	14	9	15	+ 3
Baltimore	E.	M.	68·4	55	14	10	12	? S.	14	10	12	+13
Harvard University		B.O.	69·1	49	14	1	6	+ 2	14	10	43	+36
Pulkovo		G.	69·8	345	14	1	9	+ 1	14	10	1	−15
							10	+ 2		—		...
Calcutta	E.	M.	75·8	288	14	5	54	? P.R.	14	11	·30	+ 3
Edinburgh	E.	M.	76·0	3	14	2	24	+37		—		...
Simla		O.E.	76·3	300	14	1	48	− 1	14	11	18	−15
Eskdalemuir		G.	76·7	3	14	1	53	+ 2	14	11	23	−14
Stonyhurst	E.	M.	78·1	3	14	5	6	? P.R.	14	14	12	? S.R.
Hamburg		—	78·3	355	14	2	3	+ 2	14	11	40	−16
Bidston	E.	M.	78·5	3	14	2	12	+10	14	11	24	−34
Limerick	E.	—	79·0	7	? 14	2	0	− 5	14	12	24	+20
	N.	—	79·0	7	? 14	2	0	− 5	14	12	24	+20
Makeyevka		G.	79·0	336	14	2	5	0	14	11	44	−20
West Bromwich	E.	M.	79·4	2	14	6	30	? P.R.		—		...
Cork	E.	M.	79·7	7	14	3	9	+51		—		...
Göttingen		—	80·2	355	14	2	13	+ 1	14	12	1	−16
Kew	E.	M.	80·5	1	14	14	0	? S.	14	14	0	+99
Guildford	E.	M.	80·7	2	14	2	48	+33	14	12	9	−14
Haslemere	E.	M.	80·8	2	14	5	12	? P.R.		—		...
Aachen		W.	81·2	357	14	2	21	+ 3	14	12	15	−14
Shide	N.	M.	81·3	2	14	2	30	+11		—		...
Czernowitz		Ma.	81·5	344	14	2	21	− 1	14	12	10	−23
											11	−22
Baku		G.	82·0	325	14	2	13	− 9	14	12	27	−11
Heidelberg		—	82·5	356	14	2	42	+17	14	17	30	? S.R.
Vienna		W.	83·0	350	14	2	31	+ 3	14	12	24	−25
Paris		—	83·2	360	14	2	32	+ 3	14	12	32	−19
Budapest		W.	83·4	348	14	2	30	− 1		—		...
Graz		W.	84·2	351	14	2	35	0	14	12	42	−20
							39	+ 4		—		...
Innsbruck		Ma.	84·4	354	14	2	36	0	14	12	40	−24
											51	−13
Batavia		W.	84·8	255	14	3	0	+21		—		...
Laibach		G.	85·4	351	14	2	41	− 1	14	11	45	−90
Zagreb		W.	85·5	350	? 14	2	40	− 3	? 14	12	48	−29
							47	+ 4			57	−20
Triest		W.	85·8	352	14	12	58	? S.	14	12	58	−22
Padova		V.	86·2	353	14	1	37	−69	14	13	7	−17
Riverview		—	86·4	205	? 14	13	36	? S.	14	13	36	+10
Pola		W.	86·6	352		—		...	14	12	54	−35
Moncalieri		S.	86·9	356	14	2	42	− 8	14	11	51	−101
Sarajevo		W.	87·0	348	14	2	47	− 4	14	13	0	−33
Florence		A.	87·9	353		—		...	? 14	13	30	−13
Pompeii		O.A.	90.6	351	14	12	30	? S.	14	12	30	−102
Adelaide	E.	M.	91·6	214		—		...	14	14	42	+19
Kodaikanal	E.	M.	91·9	288	14	14	0	? S.	14	14	0	−26
Ksara		Ma.	92·7	332	14	3	0	−23	14	13	0	−96
Beirut	E.	M.	92·8	333	14	15	0	? S.	14	15	0	+25
Colombo	E.	M.	92·9	284	14	16	0	? S.	14	16	0	+84
Rio Tinto	E.	M.	93·9	7	14	13	0	? S.	14	13	0	−107
Granada		Bif.	94·8	4	14	3	30	− 4	14	14	28	−28
San Fernando	E.	M.	95·2	7	14	4	0	+24		—		...
Helwan	E.	M.	97·8	335	14	3	0	−52	14	7	18	? P.R.
	N.	M.	97·8	335	14	3	30	−22	14	7	18	? P.R.
La Paz		—	115·5	92	14	10	33	? P.R.		—		...
Mauritius	E.	M.	127·4	282	14	11	42	? P.R.		—		...
	N.	M.	127·4	282	14	10	36	? P.R.		—		...
Pilar	E.	M.	128·6	96	14	12	12	? P.R.		—		...

1913. June 28d. 8h. 52m. 30s.

Adopted Origin : 39°·5N. 15°·0E. ; Makeyevka, 38°·6N. 16°·0E. ; Pulkovo, 39°·7N. 13°·9E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Pompeii	A.	1·2	311	8	53	16	+28		—		...
Montecassino	Aga.	2·2	336	8	53	44	+40	8	54	16	+45
Florence	A.	5·1	327	8	54	44	+55		—		...
Sarajevo	W.	5·1	29	8	53	53	+ 4		—		...
	V.	5·1	29	8	53	56	+ 7		—		...
						59	+10		—		...
Pola	W.	5·4	351	8	54	38	+45		—		...
Triest	W.	6·2	352	8	54	26	+21	8	55	44	+25
Zagreb	W.	6·3	6	8	54	20	+14	8	55	40	+18
Padova	V.	6·3	340	8	54	48	+42	8	57	2	+100
Laibach	G.	6·5	354	8	54	20	+11	8	55	46	+19
Graz	W.	7·6	5	8	54	39	+14	8	56	17	+21
Moncalieri	S.	7·7	318	8	54	53	+26	8	56	39	+40
Innsbruck	Ma.	8·2	343	8	54	52	+18	8	56	34	+22
Budapest	W.	8·5	19	8	55	7	+28	8	56	49	+29
Vienna	W.	8·8	6	8	55	31	+48	? 8	57	0	+32
Heidelberg	—	10·9	237	8	55	55	+42		—		...
Czernowitz	Ma.	11·8	38	8	55	29	+ 3	8	57	34	−10
						28	+ 2		—		...
Göttingen	—	12·6	345	9	0	0	? S.	9	0	0	+116
Paris	—	12·9	320	8	56	7	+25	8	58	52	+41
Aachen	W.	12·9	334	8	56	0	+18	8	59	0	+49
Hamburg	—	14·4	348	8	56	24	+23	8	59	15	+27
Granada	Bif.	14·8	264	8	56	32	+26	? 8	59	37	+40
Shide	M.	16·0	320	9	0	0	? S.	9	0	0	+35
Haslemere	M.	16·0	322	9	3	36	? S.	9	3	36	+251
Guildford	M.	16·0	322	8	59	42	+200	9	1	36	+131
Kew	M.	16·0	323	9	1	0	? S.	9	1	0	+95
Helwan E.	M.	16·5	121	8	59	0	+151		—		...
Helwan N.	M.	16·5	121	8	57	0	+31		—		...
West Bromwich	M.	17·5	324	8	57	0	+19	9	0	30	+31
Ksara	Ma.	17·6	101	9	6	48	? S.	9	6	48	+407
Stonyhurst E.	M.	18·5	326	9	4	36	? S.	9	4	36	+255
Bidston E.	M.	18·6	324	9	1	0	? S.	9	1	0	+37
Makeyevka	G.	18·6	55	8	57	3	+ 9	9	0	31	+ 8
						11	+17			39	+16
Eskdalemuir	G.	19·9	328	8	57	37	+18	9	1	17	+26
Paisley E.	M.	20·7	328	9	2	0	? S.	9	2	0	+52
Limerick E.	—	20·9	317	9	1	24	? S.	9	1	24	+12
Pulkovo	G.	22·4	20	8	57	44	−50	9	1	47	+ 4
						46	−48			50	+ 7
Tiflis	G.	22·6	75	8	57	42	−56	9	1	44	− 3
Baku	G.	22·6	89	8	58	11	−13	9	2	37	−26
Tashkent	G.	40·7	69	9	0	24	− 7	? 9	6	26	−21
Irkutsk	G.	59·4	45	9	2	50	+12	9	10	56	+10

1913. July 6d. 16h. 12m. 33s.

Adopted Origin: 1°·0s. 128°·5E.; Irkutsk, 0°·4N. 132°·0E.; Pulkovo, 16°·0N. 149°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Manila		W.	17·3	335	16	16	53	+11	16	20	3	+ 5
Batavia		W.	22·2	257	16	17	38	− 2	16	21	42	0
Perth	E.	M.	33·1	200	16	25	18	+348	? 16	25	18	+19
Adelaide	E.	M.	35·2	166	16	18	30	−78	16	25	0	−31
Osaka		O.	36·3	10	16	19	58	+ 1	16	25	38	− 9
Tsingtau		W.	37·9	349	16	20	6	− 4	16	25	48	−22
Sydney	E.	M.	39·1	149	16	21	12	+52	16	26	30	+ 3
Riverview		—	39·1	149	16	20	12	− 8	16	26	12	−15
Calcutta	E.	M.	45·6	303	16	20	42	−28	16	27	48	− 8
Colombo	E.	M.	49·2	280	16	29	0	+446	? 16	29	0	+18
Irkutsk		G.	57·0	343	16	22	32	+ 7	16	30	26	+ 7
Bombay	E.	M.	58·2	293	16	33	0	+627	? 16	33	0	+126
Simla		O.E.	58·3	308	16	22	12	−22		—		...
Tashkent		G.	68·1	316	? 16	23	46	+ 8	16	32	42	+ 6
Mauritius	E.	M.	71·4	249	16	32	18	+499	? 16	32	18	−58
Honolulu	E.	M.	75·0	68	16	25	48	+86	16	35	24	+85
Baku		G.	82·0	311	16	25	0	− 3	16	35	16	− 3
Tiflis		G.	86·0	312	? 16	26	31	+65	16	36	57	+54
Beirut	E.	M.	93·1	304	16	36	0	+594	? 16	36	0	−79
Pulkovo		G.	95·0	330	16	26	4	−12	16	36	59	−40
Helwan	E.	M.	96·6	300		—		...	16	30	0	−475
	N.	M.	96·6	300	16	26	0	−25		—		...
Czernowitz		Ma.	99·0	319		—		...	? 16	37	14	−65
Lemberg		B.O.	100·1	320	16	28	36	+112		—		...
Königsberg		W.	101·1	326		—		...	16	37	17	−82
Vienna		W.	105·3	320		—		...	16	37	36	−102
Graz		W.	106·2	319		—		...	16	41	0	+93
Zagreb		W.	106·4	315	16	31	42	+268	16	37	42	−107
Hamburg		—	107·3	327	16	29	17	+119	? 16	38	21	−76
Triest		W.	107·7	318	16	29	56	+156	16	37	40	−120
Florence		A.	110·0	317	16	34	37	? P.R.		—		...
Aachen		W.	110·6	325	16	32	0	? P.R.		—		...
Paris		—	113·5	324		—		...	16	41	35	+64
Stonyhurst	E.	M.	113·6	331	16	44	0	+973	? 16	44	0	+208
Bidston	E.	M.	114·1	331	16	40	0	+731	? 16	40	0	−36
West Bromwich	E.	M.	114·1	329	16	39	30	+701	? 16	39	30	−66
Guildford		M.	114·1	328	16	34	30	+401	? 16	38	9	−147
Shide	N.	M.	114·7	328	16	31	42	+230		—		...
Lima	E.	M.	151·5	120	? 16	32	0	+89		—		...
La Paz		—	156·0	137	16	33	5	+148		—		...

1913. July 8d. 22h. 7m. 47s.

Adopted Origin : 6°·0s. 153°·0E.; Irkutsk, 4°·8s. 142°·2E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Riverview		—	27·9	183	22	14	0	+ 6	22	18	47	+ 3
Adelaide	E.	M.	31·8	203		—		...	22	19	42	−10
Manila		W.	37·9	303	22	15	25	+ 1	22	19	42	−102
Osaka		O.	44·0	339	22	16	29	+16		—		...
Batavia		W.	45·9	268	22	16	32	+ 6	22	23	15	+ 1
Zi-ka-wei		W.	47·9	323	22	16	40	0	22	22	27	−73
		O.	47·9	323	22	16	42	+ 2		—		...
Tsingtau		W.	52·1	326	22	17	12	+ 4	22	24	26	− 6
Honolulu	E.	M.	55·3	59	22	17	18	−10	22	25	54	+42
Irkutsk		G.	71·4	331	22	19	24	+11	22	28	35	+ 5
Simla		O.E.	81·1	303		—		...	22	30	12	−11
Bombay	E.	M.	82·8	290		—		...	22	31	0	+18
Tashkent		G.	89·3	312	22	21	0	+ 1	22	31	44	− 9
Victoria	E.	M.	90·3	41	22	33	36	+751	? 22	33	36	+92
Mauritius	E.	M.	92·6	249	22	31	18	+601	? 22	31	18	−70
Baku		G.	103·9	310	22	21	53	−24	22	32	25	−114
Makeyevka		G.	111·1	319	22	27	7	+257	22	34	48	−38
Pulkovo		G.	111·2	333	22	22	34	−16	22	36	0	+34
Helwan	E.	M.	120·4	301	22	27	0	+209		—		...
	N.	M.	120·4	301	22	34	0	+629	? 22	34	0	−159
Toronto	E.	M.	120·8	42	22	31	0	+447		—		...
Ottawa		B.	122·4	39	22	28	29	+288	? 22	36	14	−40
Vienna		W.	124·0	326	22	27	4	+196		—		...
Graz		W.	125·3	326	22	28	28	+274	22	38	58	+103
Laibach		G.	126·5	325	22	29	40	...		—		...
Triest		W.	127·0	325	22	30	0	+359		—		...
Eskdalemuir		G.	127·2	343	22	27	5	+183		—		...
Innsbruck		Ma.	127·4	328	22	27	27	+204		—		...
							29	+206		—		...
Aachen		W.	127·5	334	22	29	0	+297	? 22	37	0	−31
Stonyhurst	E.	M.	128·2	342	22	39	42	+936	? 22	39	42	+127
Paris		G.	130·5	335	22	30	35	+378		—		...
						29	32	+315		—		...
Moncalieri		S.	130·7	328	? 22	29	7	+289	22	41	20	+208
											55	+243
La Paz		—	133·5	119	22	27	12	+162	22	29	58	−493
Granada		Bif.	142·3	329	22	27	49	+162		—		...
Fernando Nor.	E.	M.	168·7	151	22	27	30	+46		—		...

1913. July 12d. 10h. 23m. 30s.

Adopted Origin: 24°·5N. 143°·5E.;

Irkutsk, 29°·2N. 143°·4E.; Pulkovo, 27°·9N. 144°·4E.; Makeyevka, 32°·9N. 149°·9E.; Eskdalemuir, 29°.0N. 114°.0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	12·3	327	10	26	52	+19		—		...
Taihoku		—	20·1	279	10	28	7	— 5		—		...
Zi-ka-wei		W.	20·6	294	10	28	14	— 4	10	31	54	—11
		O.	20·6	294	10	28	15	— 3	10	31	28	—37
Tsingtau		W.	23·0	305	10	28	42	— 5	10	33	12	+17
Manila		W.	23·4	249	10	29	5	+14	10	33	14	+11
											29	+26
Irkutsk		G.	40.6	324	10	31	19	—11	10	37	15	—30
Batavia		W.	47·1	234	10	32	38	+20	10	39	28	+16
Calcutta	E.	M.	50·3	280	10	32	6	—33	10	39	42	—11
Honolulu	E.	M.	53·6	80	10	33	36	+36	10	41	24	+50
Riverview		—	58·8	172	10	42	23	? S.	? 10	42	23	+44
Tashkent		G.	62·6	305	? 10	34	11	+12	? 10	42	15	—11
Colombo	E.	M.	63·3	265	10	44	0	? S.	? 10	44	0	+85
Kodaikanal	E.	M.	64·1	272	10	47	24	+795		—		...
Bombay	E.	M.	65·3	281	10	42	48	? S.	? 10	42	48	—11
Victoria	E.	M.	73·9	44	10	44	48	? S.	? 10	44	48	+ 5
Baku		G.	77·0	309	10	35	19	—12	10	45	1	—18
Pulkovo		G.	79·7	332	10	35	48	+ 1	10	45	37	—13
Tiflis		G.	80·0	311	10	35	52	+ 3	10	45	48	— 5
Makeyevka		G.	81·6	319	10	36	0	+ 2	10	46	0	—12
							2	+ 4		—		...
Czernowitz		Ma.	88·2	324	10	36	48	+12	10	47	6	—18
											7	—17
Lemberg		B.O.	88·6	325	10	59	3	+1345		—		...
Hamburg		—	92·1	334	10	36	52	— 6	10	47	23	—43
Budapest		W.	92·4	326	10	42	24	+325		—		...
Vienna		W.	93·2	328	10	36	50	—13	10	47	30	—47
Graz		W.	94·4	327	10	37	5	— 5	? 10	47	33	—57
Edinburgh	E.	M.	94·7	342	10	48	30	...	? 10	48	30	— 3
Sarajevo	N.	W.	95·1	324	10	36	30	—44	10	47	30	—67
Helwan	E.	M.	95·1	306	10	40	0	+166	10	49	0	+23
	N.	M.	95·1	306	10	41	0	+226	10	48	0	—37
Zagreb		W.	95·2	326	10	37	4	—10	10	47	36	—62
							14	0		—		...
Eskdalemuir		G.	95·2	342	10	37	6	— 8	? 10	47	34	—64
Aachen		W.	95·9	334	10	37	0	—18	10	47	44	—61
Heidelberg		—	95·9	332	10	38	15	+57	10	50	36	+111
Triest		W.	96·3	327	10	40	0	+159	10	47	43	—66
Stonyhurst	E.	M.	96·3	341	10	47	0	? S.	? 10	47	0	—109
Bidston	E.	M.	96·8	341	10	48	0	? S.	? 10	48	0	—54
West Bromwich		M.	97·3	340	10	40	0	+154		—		...
Padova		V.	97·3	328	10	37	41	+15	10	48	11	—48
Guildford		M.	97·9	339	10	45	8	+459	? 10	56	43	+458
Paris		—	98·7	335	10	37	23	—11	10	48	3	—70
Limerick	E.	—	99·1	343	10	35	24	—132		—		...
	N.	—	99·1	343	10	41	48	−252		---		...
Moncalieri		S.	99·6	330	10	37	13	—26	10	48	10	—72
											11	—71
Toronto	E.	M.	101·2	30	11	1	30	+1424		—		...
Ottawa		B.	101·4	27	10	48	16	? S.	? 10	48	16	—83
Granada		Bif.	110·9	332	10	37	17	—75	10	48	47	—139
San Fernando	E.	M.	112·5	334	11	24	30	+2751		—		...
	N.	M.	112·5	334	11	23	30	+2691		—		...

1913. July 22d. 6h. 33m. 57s.

Adopted Origin: 5°·0s. 155°·0E.; Irkutsk, 3°·8s. 147°·1E.; Pulkovo, 5°·0s. 155°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Riverview		—	29·0	186	? 6	40	24	+ 9		—		...
Adelaide	E.	M.	33·6	205	6	42	36	+108	6	46	30	− 1
Manila		W.	39·0	301	6	41	40	− 3		—		...
Osaka		O.	43·7	336	? 6	43	22	+61		—		...
Taihoku		—	44·3	314	6	42	46	+21		—		...
Batavia		W.	48·0	266	? 6	44	0	+69		—		...
Zi-ka-wei		W.	48·3	321	? 6	42	56	+ 3	6	49	40	−15
		O.	48·3	321	? 6	43	34	+41	6	49	40	−15
Honolulu	E.	M.	53·0	58	6	44	18	+55	6	51	42	+49
Calcutta	E.	M.	70·7	296	6	53	18	? S.	? 6	53	18	−73
Irkutsk		G.	71·5	330	6	45	53	+29	6	54	45	+ 4
Simla		O.E.	82·2	302		—		...	? 6	57	24	+29
Bombay	E.	M.	84·3	290	6	52	30	+349		—		...
Tashkent		G.	90·1	311	6	47	20	+ 6	6	57	44	−28
Tiflis		G.	108·4	312	6	48	43	− 4	6	59	21	−110
Pulkovo		G.	111·2	334	6	48	55	− 5	7	1	29	− 7
Makeyevka		G.	111·6	320	6	50	56	+114	7	3	48	+129
Ottawa		B.	120·3	39		—		...	? 7	0	17	−151
Hamburg		—	123·7	335		—		...	7	0	23	−171
Vienna		W.	124·2	328	6	53	30	+211	? 7	2	0	−77
Harvard		B.O.	125·0	41	6	46	4	−239	6	54	4	−559
Graz		W.	125·5	327	6	53	33	+208	7	2	2	−85
Zagreb		W.	126·1	326	? 6	53	31	+204	7	2	7	−84
Triest		W.	127·3	326	6	52	48	+156	7	0	28	−191
Heidelberg		—	127·4	333	6	56	29	+376	? 7	2	0	−100
Aachen		W.	127·4	336	6	55	0	+287	? 7	2	20	−80
Innsbruck		Ma.	127·5	330	6	53	28	+195	? 7	0	30	−191
Guildford		M.	129·5	340	6	57	0	+397	? 7	8	21	+266
Pompeii		O.A.	129·8	321	6	51	0	+36		—		...
Shide	E.	M.	130·1	341	6	50	18	− 7		—		...
Paris		—	130·4	336	6	56	55	+388	? 7	2	39	−81
Limerick	N.	—	130·5	347	6	56	0	+333		—		...
	E.	—	130·5	347	7	2	18	? S.	? 7	2	18	−103
Moncalieri		S.	130·9	330	? 6	55	42	+313	7	6	58	+175
La Paz		—	132·2	118	6	54	25	+231	6	57	22	−350
Fernando Noronha	E.	M.	168·5	140	7	3	42	? S.	? 7	3	42	−198

1913. July 25d. 12h. 37m. 50s.

Adopted Origin: 14°·0N. 83°·0W.; Pulkovo, 16°·0N. 78°·0W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Lima	E.	M.	25·7	166	12	48	15	+280	? 12	48	15	+ 9
La Paz		—	32·9	153	12	44	31	−14	12	52	4	+112
Ottawa		B.	33·0	9	12	44	46	0	12	50	10	− 4
Pilar	E.	M.	48·3	158	12	53	0	+374	? 12	53	0	−48
Fernando Norhona	E.	M.	52·9	105	12	46	0	−75	12	53	0	−105
Cork	E.	M.	70·2	39	13	0	0	+652	? 13	0	0	+102
Honolulu	E.	M.	71·5	288	13	2	6	+769		—		...
San Fernando	E.	M.	71·7	56	13	1	30	+732		—		...
	N.	M.	71·7	56	12	55	0	+342	? 12	55	0	−216
Eskdalemuir		G.	73·5	36	12	49	35	+ 5		—		...
Edinburgh	E.	M.	73·6	35	12	59	12	+582	? 12	59	12	+13
Bidston	E.	M.	73·6	38	12	59	36	+606	? 12	59	36	+37
Granada		Bif.	73·8	55	12	49	36	+ 5	12	59	36	+34
Stonyhurst	E.	M.	74·0	37	13	1	24	+712	? 13	1	24	+140
West Bromwich		M.	74·3	39		—		...	12	59	0	− 8
Guildford		M.	75·2	40	12	49	59	+19	12	59	18	0
Kew	E.	M.	75·3	40	13	1	48	+727	13	1	48	+148
Paris		M.	77·3	42	12	49	58	+ 5	12	59	43	+ 1
Heidelberg		—	81·0	41	12	49	24	−51	13	0	0	−25
Moncalieri		S.	81·3	46	12	50	14	− 3	13	0	23	− 5
Hamburg		—	81·3	37	12	50	19	+ 2	13	0	30	+ 2
Triest		W.	85·3	44	? 12	50	32	− 8	13	1	0	−12
Graz		W.	86·1	42	12	50	43	− 1	13	1	18	− 3
Vienna		W.	86·4	41	12	50	47	+ 2		—		...
Zagreb		W.	86·6	44	12	50	49	+ 2	13	1	18	− 9
Königsberg		W.	87·0	35	12	50	48	− 1	13	1	24	− 7
Pulkovo		G.	89·9	28	12	51	3	− 4	13	1	35	−28
Makeyevka		G.	99·7	36	12	51	17	−42	13	2	43	−60
Helwan	E.	M.	103·6	54	13	3	0	+642	? 13	3	0	−79
	N.	M.	103·6	54	13	1	0	+522	? 13	1	0	−199
Tiflis		G.	107·2	38		—		...	13	6	19	+86
Irkutsk		G.	114·4	350	? 12	57	45	...	? 13	7	22	+87
Tashkent		G.	120·0	24		—		...	13	8	0	+81

1913. July 26d. 20h. 50m. 59s.

Adopted Origin: 67°·5N. 18°·6E.; Pulkovo, 67°·5N. 18°·6W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O—C. S.	S. H.	M.	S.	O—C. S.
Edinburgh	E.	M.	13·6	141	20	56	48	? S.	? 20	56	48	− 9
Eskdalemuir		G.	14·1	142	20	54	20	− 6	? 20	57	0	− 9
Limerick		—	15·6	157	20	55	6	+20		—		...
Stonyhurst	E.	M.	15·7	143	20	58	18	? S.	? 20	58	18	+31
Bidston	E.	M.	15·9	144	20	56	36	? S.	? 20	56	36	−76
Cork	E.	M.	16·3	157	21	0	0	+305		—		...
West Bromwich		M.	17·0	143	20	54	30	−34	20	57	48	−29
Kew	E.	M.	18·4	142	20	57	24	? S.	? 20	57	24	−84
Guildford		M.	18·5	142	20	55	12	−10	? 20	59	15	+25
Haslemere	E.	M.	18·6	143	? 20	59	0	? S.	? 20	59	0	+ 8
Hamburg		—	19·5	122	20	55	34	0	20	59	7	− 5
Aachen		W.	20·7	132	20	55	43	− 5	20	59	26	−11
Paris		—	21·5	140	20	55	54	− 4	20	59	46	− 8
Königsberg		W.	22·2	106	20	56	0	− 6	21	0	1	− 7
Pulkovo		G.	22·3	93	29	56	8	0	21	0	11	+ 4
							13	+ 5			17	+10
Heidelberg		—	22·6	130	20	56	9	− 2	21	0	28	+12
Breslau		W.	23·9	116	20	56	21	− 5	21	0	0	−40
Innsbruck		Ma.	25·4	128	20	56	33	− 8	21	1	12	+ 2
Vienna		W.	26·1	120	20	56	45	− 3	21	1	14	− 9
Moncalieri		S.	26·4	135	20	56	38	−13	21	1	22	− 7
Graz		W.	26·8	122	22	56	27	−28	23	1	35	− 1
Padova		V.	27·2	129	20	57	16	+17	21	1	59	+15
Triest		W.	27·5	126	20	56	51	−11	21	2	30	+41
Budapest		W.	27·7	117	20	56	50	−14		—		...
Lemberg		B.O.	27·8	109	20	58	6	+61		—		...
							30	+85		—		...
Zagreb		W.	28·0	124	20	57	6	− 1	21	1	57	− 1
										2	8	+10
Pola		W.	28·3	127		—		...	21	2	48	+45
Florence		A.	28·5	131	20	55	23	−109		—		...
Azores	E.	M.	30·0	191	21	3	36	? S.	? 21	3	36	+63
Rio Tinto	E.	M.	30·5	161	21	1	0	? S.	? 21	1	0	−102
Granada		Bif.	31·5	157	20	57	49	+ 7	21	4	35	+96
San Fernando	E.	M.	31·8	161	21	5	0	? S.	? 21	5	0	+116
	N.	M.	31·8	161	21	1	0	? S.	? 21	1	0	+124
Pompeii		O.A.	32·3	133	20	58	0	+11		—		...
Makeyevka		G.	34·1	95	20	58	29	+24	21	4	11	+30
Ottawa		B.	36·5	262	20	58	23	− 2	21	4	11	− 5
Harvard University	E.	B.O.	37·4	255	? 20	58	29	− 3	21	4	24	− 5
Toronto	E.	M.	39·4	263	? 21	4	6	? S.	? 21	4	6	−51
Tiflis		G.	42·1	95		—		...	? 21	5	26	− 8
Helwan	E.	M.	47·6	116	21	6	0	? S.	? 21	6	0	−48
	N.	M.	47·6	116	21	7	0	? S.	? 21	7	0	+12
Victoria	E.	M.	51·3	305	21	18	0	+1066		—		...
Tashkent		G.	51·7	73	21	0	30	+13	21	7	47	+ 8
Irkutsk		G.	52·9	40	21	0	31	+ 7	21	8	5	+11

1913. July 28d. 5h. 39m. 20s.

Adopted Origin: 17°·5s. 74°·5w.; La Paz, 73°·5w. 15°·4s.; Eskdalemuir, 18°·5s. 62°·0w.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O – C. S.	S. H.	M.	S.	O – C. S.
Lima	E.	M.	6·0	335	5	40	16	–36		—		...
La Paz		—	6·1	82	5	40	56	+ 3	5	42	12	+ 5
Pilar	E.	M.	17·1	148	5	43	30	+ 4	? 5	46	36	– 4
Harvard University		B.O.	60·0	3	? 5	49	36	+ 4	5	57	35	– 8
Toronto	E.	M.	61·3	356	5	48	0	–101	5	57	42	–18
Ottawa		B.	62·9	359	5	49	43	– 8	5	58	2	–18
Azores	E.	M.	71·8	39	5	59	12	? S.	? 5	59	12	–56
Victoria	E.	M.	79·0	329	5	52	6	+33	6	1	6	–26
San Fernando	E.	M.	83·9	49	6	1	30	+569	? 6	1	30	–57
	N.	M.	83·9	49	5	51	0	–61		—		...
Rio Tinto	E.	M.	84·3	47	6	0	0	? S.	? 6	0	0	–151
Granada		Bif.	86·2	49	5	52	4	–10	6	2	38	–14
Limerick		—	90·1	34	5	52	42	+ 5	6	3	12	–23
Honolulu	E.	M.	90·6	292	6	3	18	? S.	? 6	3	18	–22
Shide	E.	M.	93·3	37	5	54	0	+66	6	3	0	–68
Bidston	E.	M.	93·5	34	5	52	0	–55	5	55	42	–509
West Bromwich		—	93·7	36		—		...	6	2	30	–103
Haslemere	E.	M.	93·8	37	6	3	12	? S.	? 6	3	12	–62
Stonyhurst	E.	M.	94·0	34	6	0	0	? S.	? 6	0	0	–256
Guildford		M.	94·0	37	5	53	36	+38	6	3	15	–61
Kew	E.	M.	94·2	37	6	2	36	? S.	? 6	2	36	–102
Eskdalemuir		G.	94·2	33	5	52	33	–26	6	3	26	–52
Edinburgh	E.	M.	94·5	32	5	52	48	–13		—		...
Paris		—	94·9	40	5	52	40	–23	6	3	17	–68
Moncalieri		S.	97·0	45	5	55	0	+106	6	5	18	+32
Aachen		W.	97·8	39	5	52	54	–25	6	3	36	–78
Heidelberg		—	98·7	41	5	57	0	+216	6	3	24	–99
Florence		A.	99·1	47	? 5	58	0	+274		—		...
Padova		V.	99·9	45	5	52	57	–33	6	3	43	–92
Innsbruck		Ma.	100·0	43	5	53	2	–29		—		...
Pompeii		O.A.	100·6	50	5	57	0	+207		—		...
Hamburg		—	100·8	37	5	56	0	+146	6	3	48	–95
Triest		W.	101·2	46	5	56	58	+202	6	3	47	–100
Graz		W.	102·6	44	5	53	22	–21	6	3	52	–108
Zagreb		W.	102·6	46	5	53	15	–28		—		...
Vienna		W.	103·6	43	5	54	22	+34	6	4	0	–109
Königsberg		W.	107·1	37	5	55	6	+62	6	5	34	–48
Czernowitz		Ma.	109·9	44		—		...	6	4	40	–127
Pulkovo		G.	112·5	32	? 5	54	1	–28	6	8	6	+55
Makeyevka		G.	118·0	45	5	53	42	–72		—		...
Tashkent		G.	140·9	45	5	58	44	+129		—		...
Irkutsk		G.	145·2	359	5	58	55	+123	6	10	57	+ 4
Batavia		W.	156·3	177	6	0	0	+145		—		...

1913. August 1d. 17h. 10m. 57s.

Adopted Origin: 47°·5N. 155°·5E.; Pulkovo, 47°·3N. 155°·0E.; Eskdalemuir, 47°·5N. 155°·5E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Osaka		O.	19·7	237	17	15	39	+ 5	17	19	30	+16
Tsingtau		W.	28·3	259	17	17	3	− 5	17	21	52	− 9
Zi-ka-wei		W.	30·6	250	17	17	11	−20	17	22	27	−14
		O.	30·6	250	17	17	29	− 2	17	22	29	−12
Irkutsk		G.	32·7	298	17	17	33	−17	17	22	48	−28
Taihoku		—	35·0	242	17	17	44	−26		—		...
Manila		W.	43·6	233	17	19	15	− 5		—		...
Victoria	E.	M.	51·7	57		—		...	? 17	27	0	−37
Calcutta	E.	M.	58·4	269	17	28	24	+446	17	33	29	+268
Tashkent		G.	58·7	299	17	21	2	+ 2	17	29	5	+ 1
Simla		O.E.	60·1	285	17	20	54	−16	17	29	6	−15
Pulkovo		G.	63·9	333	17	21	33	− 1	17	30	7	− 2
Batavia		W.	68·7	233	17	22	10	+ 4		—		...
Makeyevka		G.	70·2	321	17	22	21	+ 6	17	31	21	− 4
Königsberg		W.	70·9	334	17	22	17	− 2	17	31	35	−119
Bombay	E.	M.	71·4	278	17	22	30	+ 7		—		...
Tiflis		G.	71·8	313	17	22	26	0	17	31	45	0
Lemberg	E.	B.O.	74·4	330	17	22	44	+ 2	17	32	20	+ 4
	N.	B.O.	74·4	330	17	22	52	+10	17	32	24	+ 8
Kodaikanal	E.	M.	74·5	267	17	22	6	−37		—		...
Czernowitz		Ma.	74·7	328	17	22	43	+ 1	17	32	15	− 4
Hamburg		—	74·8	340	17	22	41	− 4	17	32	22	+ 1
Edinburgh	E.	M.	75·1	348	17	22	48	+ 1		—		...
Breslau		W.	75·2	334	17	22	52	+ 5	17	32	30	+ 5
Colombo	E.	M.	75·3	264	17	24	18	+90	17	34	12	+106
Eskdalemuir		G.	75·6	348	17	22	46	− 4	17	32	28	− 2
St. Louis		W.	76·0	47		—		...	? 17	33	2	+28
Toronto	E.	M.	76·8	37	17	20	54	−123	17	33	12	+28
Ottawa		B.	76·8	34	17	22	51	− 6	17	32	29	−15
Stonyhurst	E.	M.	77·0	347	17	33	0	? S.	? 17	33	0	+14
Bidston	E.	M.	77·4	347	17	22	42	−18	17	32	12	−38
Vienna		W.	77·9	333	17	22	59	− 4	17	32	57	+ 1
						23	2	− 1		—		...
West Bromwich		M.	78·1	346	17	22	30	−35	17	33	0	+ 2
Aachen		W.	78·3	341	17	23	0	− 6	17	32	54	− 7
										33	1	0
Kew	E.	M.	78·9	345	17	31	42	? S.	? 17	31	42	−86
Heidelberg		—	79·0	339	17	23	10	0	17	33	10	+ 1
Graz		W.	79·2	333	17	23	8	− 3	17	33	13	+ 2
Guildford		M.	79·2	345	17	22	33	−38	? 17	33	0	−11
Haslemere	E.	M.	79·3	345	17	31	45	? S.	? 17	31	45	−87
Shide	N.	M.	79·8	345	17	20	30	−165	17	35	30	+132
Innsbruck		Ma.	80·2	336	17	23	12	− 5	17	33	16	− 6
Zagreb		W.	80·2	333	17	23	12	− 5	17	33	21	− 1
							21	+ 4		—		...
Laibach		G.	80·4	334	17	23	6	−12	17	33	24	− 1
Paris		—	80·9	342	17	23	15	− 6	17	33	29	− 2
Triest		W.	81·0	334	17	23	13	+ 9	17	33	22	−10
Sarajevo		W.	81·1	330	17	23	24	+ 1	17	33	30	− 3
Harvard University		B.O.	81·1	33	17	23	24	+ 1	17	33	25	− 8
Riverview		—	81·4	184	17	23	24	0	17	33	18	−18
Pola		W.	81·7	334	17	23	18	− 8	17	33	34	− 6
Padova		V.	81·8	335	17	23	23	− 3	17	33	34	− 7
Ksara		Ma.	82·3	313	17	23	30	+ 1	17	33	34	−12
Moncalieri		S.	83·3	338	17	23	27	− 8	17	33	51	− 6
Florence	E.	A.	83·4	335	17	23	33	− 2	17	34	3	+ 5
	N.	A.	83·4	335	17	23	45	+10	17	34	0	+ 2
Monte Cassino		Aga.	84·7	332	17	23	41	− 2		—		...
Pompeii	N.	O.A.	85·3	331	17	23	35	−12	17	36	30	+131
Helwan	E.	M.	87·8	314	17	25	36	+95	17	36	0	+73
	N.	M.	87·8	314	17	25	0	+59	17	34	54	+ 7
Rio Tinto	E.	M.	93·3	346	17	25	0	+29		—		...
Granada		Bif.	93·3	343	17	24	15	−16	17	35	20	−25
San Fernando		M.	94·4	345	17	24	30	− 7		—		...
La Paz		—	132·7	64	17	30	28	+171	17	47	44	+388
Fernando Noronha	E.	M.	135·8	11	17	27	30	−20		—		...
Pilar	E.	M.	146·3	77	17	53	12	+1479		—		...

1913. August 6d. 22h. 14m. 14s.

Adopted Origin: 18°·0s. 73°·0w.; La Paz, 15°·1s. 73°·5w. Granada, 13°·6s. 74°·0w.; Eskdale, 17°·0s. 61°·0w.; Pulkovo, 11°·9s. 74°·2w.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
La Paz		—	4·9	70	22	15	57	+27		—		...
Lima	E.	M.	7·1	326	22	16	56	+54		—		...
Pilar		—	16·0	151	22	18	30	+24		—		...
Fernando Noronha		—	42·2	75	? 22	25	30	+184		—		...
St. Louis	N.	W.	58·8	344	22	24	22	+ 4	? 22	29	19	−184
Harvard University		B.O.	60·4	2	22	24	30	+ 1	22	32	34	− 8
Toronto	E.	M.	61·9	355	22	24	36	− 2		—		...
Ottawa	N.	B.	63·4	358	22	24	50	+ 2	22	33	12	− 8
							54	+ 6		—		...
Azores	E.	M.	71·3	38	22	26	30	+51		—		...
Santa Clara		W.	72·0	321	22	26	6	+22		—		...
Victoria	E.	M.	79·7	329	22	27	12	+41		—		...
Cape Town	E.	M.	81·3	123	22	27	36	+55		—		...
San Fernando		M.	83·2	48	22	27	0	+ 9		—		...
Granada		Bif.	85·4	48	22	27	8	+ 4	22	37	37	0
Stonyhurst	E.	M.	90·8	34	22	27	24	−10	22	38	0	−36
Honolulu	E.	M.	92·1	292	22	29	18	+96	22	39	12	+22
Shide	E.	M.S.	92·5	37	22	27	30	−14	22	38	42	−12
Bidston	E.	M.	93·1	34	22	27	54	+ 7	22	39	0	0
West Bromwich		M.	93·3	35	22	27	48	0	22	38	24	−38
Haslemere	E.	M.	93·4	37	22	28	18	+30	22	39	0	− 3
Guildford		M.	93·5	37	22	27	47	− 2	22	39	12	+ 7
Kew	E.	M.	93·8	37	22	26	54	−57		—		...
Eskdalemuir		G.	93·8	32	22	27	45	− 6	22	38	32	−36
Edinburgh	E.	M.	94·2	32	22	27	48	− 5		—		...
Paris		—	94·4	40	22	27	52	− 2	22	38	28	−46
Moncalieri		S.	96·4	45	22	28	4	− 1	22	39	3	−31
Aachen		W.	97·2	39	22	28	4	− 5	22	38	38	−64
Heidelberg		—	98·2	41	22	28	15	0	22	39	4	−48
Florence		A.	98·4	47	22	28	10	− 6	22	38	55	−59
Padova		V.	99·3	45	22	28	15	− 6	22	39	22	−41
Innsbruck		Ma.	99·4	43	22	28	14	− 7	22	38	51	−73
Pompeii	E.	O.A.	99·9	50	22	29	10	+46	22	39	0	−69
Hamburg		—	100·3	37	22	28	14	−12	22	39	54	−19
Pola		W.	100·4	46		—		...	22	39	47	−27
Triest		W.	100·6	45	22	28	19	− 8	22	39	20	−55
Laibach		G.	101·2	45	22	28	32	+ 2	22	39	9	−72
Zagreb		W.	101·9	45	22	28	34	0	22	39	13	−75
Graz		W.	102·0	44	22	28	29	− 5	22	39	23	−66
Vienna		W.	102·9	43	22	28	34	− 5	22	38	54	−103
Sarajevo		W.	103·4	48	22	28	36	− 5	22	40	18	−24
Breslau		W.	103·9	40	22	28	35	− 9	22	39	42	−64
Budapest		W.	104·6	44	22	28	43	− 3	22	39	19	−93
Königsberg		W.	106·7	37	22	28	50	− 7	22	40	42	−30
Lemberg		B.O.	108·0	43	22	32	38	+216	22	43	14	+110
Czernowitz		Ma.	109·3	44	? 22	29	0	− 8	22	40	5	−91
Helwan	N.	M.	111·0	64	22	32	18	+182	22	40	42	−69
Pulkovo		G.	112·2	32	22	29	8	−14	22	41	47	−35
Sydney	E.	M.	113·0	219	22	28	30	−55	22	34	36	? P.R.
Riverview		—	113·1	219	22	31	0	+94	22	43	50	+101
Beirut	E.	M.	115·0	60	22	34	0	+266		—		...
Ksara		Ma.	115·4	61	22	34	1	+265	? 22	42	12	−15
Makeyevka		G.	117·5	45	22	30	47	+61	22	43	33	+49
Mauritius	E.	M.	118·6	126	22	34	24	+274		—		...
Adelaide	E.	M.	119·1	210	22	27	36	−136		—		...
Tiflis		G.	122·4	52	22	30	1	− 2	22	34	59	? P.R.
Perth	E.	M.	129·3	190	22	18	0	−759		—		...
Tashkent		G.	140·3	46	22	31	18	− 8	22	47	14	+114
Irkutsk		G.	145·6	357	22	34	2	+135	22	47	32	+103
Bombay	E.	M.	147·6	83	22	34	6	+131		—		...
Cocos	E.	M.	148·2	161	22	38	0	+362		—		...
Osaka		O.	149·7	309	22	34	25	+141	22	52	53	+403
Simla		O.E.	150·0	58	22	34	0	+115	22	45	0	−71
Kodiakanal	E.	M.	150·3	102	22	28	48	−199		—		...
Colombo	E.	M.	151·3	109	22	36	30	+259	? 22	50	0	+223
Batavia		W.	155·8	179	22	21	32	−655	22	35	18	−677
Tsingtau		W.	158·4	330	22	34	36	+119	22	47	6	+21
Zi-ka-wei		O.	161·4	318	22	35	28	+161	22	59	9	+734
Calcutta	E.	M.	162·0	74	22	34	48	+119	22	38	12	−525
Manila		W.	166·2	281	22	22	0	−663	22	34	22	−769

1913. August 13d. 4h. 25m. 31s.

Adopted Origin: 7°·0s. 105°·0E.;

Irkutsk, 2°·1s. 109°·3E.; Tiflis, 9°·1s. 111°·1E.; Pulkovo, 2°·9s. 108°·1E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.		S. H.	M.	S.	O−C. S.
Batavia		W.	1·9	70	4	26	10	+10			—		...
Manila		W.	26·8	36	4	31	18	− 9	?	4	33	41	−147
Perth	E.	M.	26·9	159	4	31	24	− 4			—		...
Colombo	E.	M.	28·7	298	4	31	12	−34		4	36	12	−31
Kodiakanal	E.	M.	32·4	302	4	28	48	−214			—		...
Calcutta	E.	M.	33·7	331	4	37	27	? S.	?	4	37	27	−39
Taihoku		—	35·8	26	4	32	46	− 5			—		...
Bombay	E.	M.	41·0	310	4	33	6	−28			—		...
Zi-ka-wei		W.	41·3	22	4	33	22	−14		4	39	10	−46
		O.	41·3	22	4	33	17	−19		4	39	35	−21
Adelaide	E.	M.	41·6	137	4	33	54	+15			—		...
Tsingtau		W.	45·4	17	4	33	54	−13		4	40	32	−19
Simla		O.E.	46·5	327	4	34	0	−15		4	40	36	−30
Mauritius	E.	M.	47·4	249	4	36	36	+135			—		...
Sydney	E.	M.	50·3	129	4	34	30	−10		4	41	30	−24
Riverview		—	50·3	129	4	34	36	− 4		4	41	42	−12
Osaka		O.	50·6	33	4	34	34	− 8			—		...
Tashkent		G.	58·3	330	4	35	33	+ 1		4	43	28	− 6
Irkutsk		G.	59·3	359	4	35	37	− 1		4	43	39	− 7
Tiflis		G.	73·3	317	4	37	11	+ 2		4	46	38	+ 1
Ksara		Ma.	77·0	307	4	38	39	+67		4	48	26	+66
Beirut	E.	M.	77·3	307	4	37	30	− 4			—		...
Helwan	E.	M.	79·5	302	4	36	30	−77			—		...
	N.	M.	79·5	302	4	39	0	+73			—		...
Makeyevka		G.	80·3	322	4	37	26	−26		4	47	28	−30
Cape Town	E.	M.	83·2	237	4	49	0	? S.	?	4	49	0	+30
Czernowitz		Ma.	88·0	319	4	38	30	− 6		4	48	51	−32
Pulkovo		G.	88·5	331	4	38	30	− 9		4	48	52	−37
							32	− 7		4	49	12	−17
Lemberg		B.O.	89·5	320	4	38	45	+ 1		4	49	9	−31
Sarajevo		W.	92·4	314	4	38	30	−30		4	49	48	−22
							48	−12			—		...
Breslau		W.	94·2	321	4	39	58	+48		4	42	43	+466
Vienna		W.	94·3	318	4	38	34	−37		4	50	0	−30
Zagreb		W.	94·6	316	4	39	1	−13		4	49	31	−62
										4	50	10	−23
Graz		W.	94·8	317	4	39	3	−10		4	49	12	−83
Pompeii	E.	O.A.	94·9	310	4	39	5	− 9		4	50	15	−21
	N.	O.A.	94·9	310	4	39	5	− 9		4	50	20	−16
Padova		V.	97·2	315	4	39	47	+20		4	49	45	−74
Florence		A.	97·5	313	4	42	42	+194			—		...
Innsbruck		Ma.	97·6	317		—		...	?	4	49	41	−82
Hamburg		—	98·6	323	4	39	17	−17			—		...
Heidelberg		—	99·6	315	4	43	30	? P.R.		4	53	0	+97
Moncalieri		S.	100·1	315	4	39	24	−18		4	48	16	−192
Aachen	N.	W.	101·1	320		—		...		4	51	9	−28
	E.	W.	101·1	320	4	39	30	−17		4	50	7	−90
Paris		G.	102·9	319	4	40	0	+ 4			—		...
Guildford		M.	105·2	321	4	40	48	+41		4	50	51	−84
Shide		M.	105·7	321	4	49	0	? S.		4	49	0	−200
West Bromwich		M.	105·9	323	4	39	0	−70		4	52	0	−22
Stonyhurst	E.	M.	105·9	324	4	45	0	+290			—		...
Edinburgh	E.	M.	106·0	326	4	44	24	+254			—		...
Eskdalemuir		G.	106·1	326	4	39	53	−18		4	51	0	−84
Bidston	E.	M.	106·4	324	4	51	12	? S.	?	4	51	12	−75
Granada		Bif.	109·1	307	4	40	37	+13		4	50	18	−153
Pilar	E.	M.	139·9	195	4	52	36	+594			—		...
Ottawa		B.	141·6	359	4	45	6	+138			—		...

1913. August 15d. 19h. 2m. 52s.

Adopted Origin: 26°·0N. 143°·0E.; Irkutsk, 28°·0N. 143°·9E.; Pulkovo, 26°·9N. 141°·5E.; Eskdalemuir, 39°·0N. 160°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Osaka		O.	10·9	325	19	5	33	— 2		—		...
Nagasaki		—	13·2	303	19	6	11	+ 3		—		...
Zi-ka-wei		W.	19·6	290	19	7	24	— 4	19	10	56	—11
		O.	19·6	290	19	7	26	— 2	19	11	4	— 3
Tsingtau		W.	21·8	303	19	7	49	— 6	19	11	48	— 5
Manila		W.	23·5	245	19	8	22	+ 7		—		..
Irkutsk		G.	39·1	323	19	10	23	—16	19	16	23	— 23
Honolulu	E.	M.	53·8	81		—		...	19	19	48	—10
Riverview		—	60·3	172	19	21	36	? S.	? 19	21	36	+17
Sydney	E.	M.	60·3	172	19	20	54	? S.	? 19	20	54	—25
Bombay	E.	M.	64·6	280	19	23	42	? S.	? 19	23	42	+90
Pulkovo		G.	78·3	332	19	15	0	— 1	19	24	50	— 6
							3	+ 2		—		...
Tashkent		G.	78·7	311	19	13	17	—106	19	21	33	—207
Makeyevka		G.	80·2	319	19	14	54	—18	19	24	37	—40
Czernowitz		Ma.	86·8	324	19	15	46	— 4	19	26	12	—19
Lemberg		B.O.	87·2	325	19	26	23	? S.	? 19	26	23	—12
Breslau		W.	89·5	329	19	16	11	+ 6		—		...
Hamburg		—	90·7	334	19	16	38	+26	19	26	35	—38
Budapest		W.	90·9	326	19	26	25	? S.	? 19	26	25	—50
Vienna		W.	91·8	328	19	16	23	+ 5	19	26	45	—40
Graz		W.	93·0	327	19	16	15	—10	19	26	49	—48
Edinburgh	E.	M.	93·2	342	19	27	42	? S.	? 19	27	42	+ 3
Eskdalemuir		G.	93·7	341	19	16	17	—11	19	26	50	—55
Zagreb		W.	93·7	326	19	16	0	—28	19	26	46	—59
											51	—54
Helwan	E.	M.	93·9	306	19	22	0	+331		—		...
	N.	M.	93·9	306	19	26	0	? S.	? 19	26	0	—107
Aachen		W.	94·4	334	19	16	18	—14	19	26	58	—54
Heidelberg		—	94·5	332		—		...	19	26	59	—54
Stonyhurst	E.	M.	94·8	340	19	28	0	? S.	? 19	28	0	+ 4
Bidston	E.	M.	95·3	340	19	27	24	? S.	? 19	27	24	—37
West Bromwich		M.	95·8	340	19	18	24	+104	19	26	30	—96
Guildford		M.	96·4	338	19	15	48	—55	19	26	42	—90
		M.	96·4	338	19	16	24	—19	19	27	24	—48
Shide	E.	M.S.	97·1	338	19	29	0	? S.	? 19	29	0	+41
Paris		—	97·3	335	19	16	41	— 7	19	27	10	—71
Florence		A.	97·4	327	19	22	29	+341	19	32	59	+277
Moncalieri		S.	98·2	330		—		...	19	30	35	+125
Toronto	E.	M.	100·2	30	? 19	21	36	+272		—		
Ottawa		B.	100·3	27	19	27	27	? S.	? 19	27	27	—84
Harvard University		B.O.	104·8	25	? 19	27	24	? S.	? 19	27	24	—128
Granada		Bif.	109·4	332	19	17	58	+11	19	30	41	+26
San Fernando	N.	M.	111·1	334	19	27	30	? S.	? 19	27	30	—180
La Paz		—	149·6	79	19	23	2	+141		—		...

1913. September 3d. 20h. 51m. 10s.

Adopted Origin: 6°·5s. 153°·5E.;

Irkutsk, 6°·5s. 150°·3E.; Tashkent, 5°·0s. 151°·1E.; Tiflis, 13°·7s. 141°·6E.; Pulkovo, 7°·5s. 150°·8E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Riverview		—	27·4	184	20	57	18	+ 6	21	2	7	+ 9
							26	+14		—		...
Sydney	E.	M.	27·4	184	20	57	18	+ 6	21	2	24	+26
Adelaide	E.	M.	31·6	204	20	58	12	+19	21	3	12	+ 1
Manila		W.	38·5	303	20	57	54	—58		—		...
Perth	E.	M.	43·3	229	21	0	12	+42		—		...
Taihoku		—	44·3	317	20	59	38	0		—		...
Osaka		O.	44·8	339	20	59	33	— 9		—		...
Batavia		W.	46·4	268	20	59	49	— 4	21	6	38	— 5
Zi-ka-wei		W.	48·7	323	20	59	52	—16	21	6	38	—34
		O.	48·7	323	21	0	1	— 7	21	6	52	—20
Tsingtau		W.	52·7	326	21	1	30	+56	21	7	54	— 8
Honolulu	E.	M.	55·1	58	? 21	0	42	— 8	? 21	8	12	—20
Cocos	E.	M.	56·1	260	21	4	0	+183		—		...
Calcutta	E.	M.	70·0	297	21	11	17	? S.	? 21	11	17	—19
Irkutsk		G.	72·1	331	21	2	41	0	21	11	53	— 8
Colombo	E.	M.	74·7	279	21	3	18	+21	21	13	42	+70
Kodiakanal	E.	M.	78·2	? 283	21	2	48	—30		—		...
Simla		O.E.	82·4	303	21	3	24	—18	21	13	36	—24
Bombay	E.	M.	83·4	290	21	13	36	? S.	? 21	13	36	—35
Tashkent		G.	90·0	312	21	4	22	— 4	21	15	6	—18
Victoria	E.	M.	90·5	41	21	8	24	+235	21	14	24	—65
Mauritius	E.	M.	93·8	250	21	5	18	+31		—		...
	N.	M.	93·8	250	21	15	30	? S.	? 21	15	30	—34
Tiflis		G.	108·3	312	21	6	24	+24	21	18	28	+ 5
Pulkovo		G.	111·8	333	21	5	56	—20	21	18	31	—23
Ksara		Ma.	116·5	305	21	10	31	+234		—		...
Czernowitz		Ma.	119·1	323	21	11	30	+282	21	21	30	+97
Lemberg		B.O.	119·9	324	21	12	0	+308		—		...
Toronto	E.	M.	120·8	42	21	17	24	? S.	? 21	17	24	—161
Helwan	E.	M.	121·0	301	21	11	24	+267	21	20	6	— 1
	N.	M.	121·0	301	21	12	24	+327	21	21	18	+71
Cape Town	E.	M.	121·4	223	21	29	6	+1327		—		...
Ottawa	E.	B.	122·4	39	21	11	44	+280	21	19	25	—52
	N.	B.	122·4	39	21	11	48	+284	21	19	26	—51
Budapest		W.	123·6	325	21	11	46	+277		—		...
Hamburg		—	124·5	335	21	11	16	+242	21	22	3	+90
Graz		W.	125·9	326	21	12	3	+283	21	22	16	+94
Sarajevo		W.	125·9	321		—		...	21	22	6	+84
Zagreb		W.	126·5	324	21	10	28	+186		—		...
Harvard University		B.O.	126·8	40	? 21	17	29	+606	? 21	26	3	+314
Edinburgh	E.	M.	127·3	344	21	12	18	+293		—		...
Pilar	E.	M.	127·7	139	21	14	12	+405		—		...
Eskdalemuir		G.	127·8	343		—		...	? 21	22	28	+92
Innsbruck		Ma.	128·0	328	21	10	30	+182		—		...
Heidelberg		—	128·1	332	? 21	11	26	+237		—		...
Aachen		W.	128·1	334	21	10	24	+175	21	22	46	+108
Stonyhurst	E.	M.	128·8	342	21	14	30	+418		—		...
Padova		V.	128·9	326	21	11	1	+208	21	13	54	? P.R.
Bidston	E.	M.	129·4	342	21	12	36	+301		—		...
West Bromwich		M.	129·8	341	21	10	30	+173	21	22	24	+74
Pompeii	E.	O.A.	130·0	319	21	13	30	+352		—		...
	N.	O.A.	130·0	319	21	10	55	+197		—		...
Florence		A.	130·2	325	? 21	7	37	— 2	21	12	37	? P.R.
Guildford		M.	130·4	339		—		...	21	13	3	? P.R.
Shide	E.	M.	131·1	339	21	11	30	+228		—		...
Moncalieri		S.	131·4	328	21	10	23	+159	21	22	39	+79
La Paz		—	132·8	120	21	11	26	+216		—		...
Granada		Bif.	142·9	329	21	11	10	+157	21	21	46	—44
Rio Tinto	E.	M.	143·9	333	21	8	0	—37		—		...
San Fernando		M.	144·8	331	21	11	0	+140		—		...
Fernando Noronha	E.	M.	168·1	150	21	41	0	+1855		—		...

1913. September 16d. 11h. 56m. 9s.

Adopted Origin: 3°·0N. 37°·0E.; Tashkent, 3°·5N. 40°·0E.; Granada, 4°·4N. 37°·0E.; Pulkovo, 4°·5N.; 39°·5E.; Eskdalemuir, 5°·0N. 34°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Helwan	E.	M.	27·4	349	12	2	6	− 5	12	6	18	−39
	N.	M.	27·4	349	12	1	54	−17	12	6	24	−33
Mauritius	E.	M.	30·8	139	12	7	54	? S.	? 12	7	54	− 3
	N.	M.	30·8	139	12	9	18	? S.	? 12	9	18	+81
Ksara		Ma.	30·9	358	12	2	38	− 8	12	7	23	−35
Tiflis		G.	39·3	9	12	3	51	− 7	12	9	47	−19
Makeyevka		G.	45·1	1	12	5	57	+74	12	13	6	+101
Czernowitz		Ma.	46·3	350	12	3	0	−111	12	11	13	−28
Triest		W.	47·3	338	12	4	48	−10	12	11	29	−25
Lemberg		B.O.	47·6	348	12	5	12	+12		—		...
Graz		W.	47·9	340	12	4	52	−10		—		...
Tashkent		G.	48·1	33	12	5	6	+ 2	12	11	56	− 8
Moncalieri		S.	49·2	333	12	5	11	+ 1	12	12	14	− 4
Florence		A.	49·8	336	12	3	43	−92	12	14	53	+148
Granada		Bif.	50·5	318	12	5	24	+ 5	12	12	31	− 3
Heidelberg		—	52·4	337	12	5	26	− 5	12	12	43	−15
Aachen		W.	54·4	336	12	6	0	+16	? 12	13	13	−10
Hamburg		—	55·2	341	12	5	47	− 2		—		...
Pulkovo		G.	57·0	356	12	6	4	+ 3	12	13	50	− 5
Guildford		M.	57·6	333	12	1	25	−280	12	9	58	−245
Bidston	E.	M.	60·2	334	12	15	12	? S.	? 12	15	12	+37
Eskdalemuir		G.	61·5	335	12	6	39	+ 8	12	14	43	− 8
Fernando Noronha	E.	M.	69·7	265	12	13	0	? S.	? 12	13	0	−211
Irkutsk		G.	74·0	36	12	8	6	+15	12	17	35	+12

1913. September 30d. 7h. 33m. 36s.

Adopted Origin: 35°·0N. 24°·0E.; Czernowitz, 34°·7N. 24°·3E.; Pulkovo, 35°·3N. 21°·5E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O—C. S.	S. H.	M.	S.	O—C. S.
Helwan	E.	M.	8·0	128	7	36	0	+23		—		...
	N.	M.	8·0	128	7	38	0	? S.	? 7	38	0	+47
Sarajevo	E.	W.	9·8	336	7	36	14	+11	7	38	2	+ 2
	N.	W.	9·8	336	7	36	2	− 1	7	38	2	+ 2
Ksara		Ma.	9·9	95	7	36	13	+ 8	7	38	14	+12
Zagreb		W.	12·5	332	7	36	47	+ 5	7	39	14	+ 6
							56	+14			21	+13
Budapest		W.	13·0	345	7	37	30	+41	7	40	25	+65
Laibach		G.	13·1	330	7	37	4	+14	7	40	40	+78
Florence		A.	13·1	315	7	37	3	+13	7	40	0	+38
Triest		W.	13·2	327	7	36	57	+ 5	7	39	33	+ 8
Czernowitz		Ma.	13·4	6	7	37	2	+ 8	7	39	50	+20
Graz		W.	13·7	335	7	37	3	+ 5	7	39	44	+ 7
Padova		V.	13·8	322	7	37	13	+14	7	42	1	+142
Vienna		W.	14·4	339	7	35	16	−111		—		...
Moncalieri		S.	15·9	314	7	36	59	−28	7	40	45	+16
Makeyevka		G.	16·7	34	7	39	1	+84	7	42	15	+88
Heidelberg		—	18·3	326	7	38	7	+10	7	41	35	+12
Königsberg		W.	19·9	354	7	38	23	+ 7	7	42	11	+14
Hamburg		—	20·2	335	7	38	33	+14	7	42	29	+26
Aachen		W.	20·4	326	7	38	31	+ 9	7	42	29	+22
Granada		Bif.	22·3	283	7	38	46	+ 1	7	42	56	+ 9
Guildford		M.	23·9	320	7	39	0	− 3	7	43	20	+ 2
Pulkovo		G.	25·1	8	7	39	16	+ 1	7	43	40	− 1
							18	+ 3			46	+ 5
West Bromwich		M.	25·4	321	7	39	12	− 6	7	43	12	−35
Stonyhurst	E.	M.	26·3	323	7	47	0	+453		—		...
Bidston	E.	M.	26·4	322	7	44	24	? S.	? 7	44	24	+18
Eskdalemuir		G.	27·6	326	7	39	39	− 1		—		...
Edinburgh	E.	M.	27·9	327	7	45	6	? S.	? 7	45	6	+33
Tashkent		G.	35·7	66	7	40	49	− 6	7	45	31	−71
											36	−66
Irkutsk		G.	57·4	46	7	43	39	+ 8	7	51	41	+14

1913. October 2d. 4h. 23m. 28s.

Adopted Origin: 7°·5N. 79°·0W.; Granada, 7°·5N. 80°·08W.; Eskdalemuir, 8°·7N. 84°·5W.; Pulkovo, 9°·0N. 78°·0W.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Lima	E.	M.	19·7	174	4	28	0	− 5		—		...
La Paz		—	26·3	156	4	29	19	0	4	33	55	− 1
St. Louis	N.	W.	32·6	344	4	30	41	+21	4	34	13	−93
					4	29	47	−33		—		...
	E.	W.	32·6	344		—		...	4	35	53	+ 7
Harvard Univ.	N.	B.O.	35·5	10	4	30	53	+ 7	4	36	38	+ 7
	E.	B.O.	35·5	10	4	30	36	−10	4	36	18	−13
Toronto	E.	M.	36·1	360	4	31	54	+63		—		...
Ottawa		B.	38·0	4	4	30	52	−14	4	36	46	−20
Pilar	E.	M.	41·8	161	4	33	24	+107	? 4	37	42	−18
Santa Clara		W.	49·0	314	4	32	15	−13		—		...
Victoria	E.	M.	55·3	326	4	34	54	+105		—		...
Azores	E.	M.	56·7	49	4	33	54	+36		—		...
Rio Tinto	E.	M.	71·5	53	4	45	0	? S.	? 4	45	0	+48
San Fernando	E.	M.	71·7	54	4	37	0	+124		—		...
	N.	M.	71·7	54	4	39	0	+244		—		...
Cork	E.	M.	72·1	38	4	44	0	? S.	? 4	44	0	−19
Granada		Bif.	73·8	53	4	35	19	+10	4	45	8	+28
Bidston	E.	M.	75·6	37	4	38	18	+177	4	44	42	−19
Eskdalemuir		G.	75·7	35	4	35	20	− 1	4	45	12	+10
Stonyhurst	E.	M.	76·0	36	4	38	54	+211	4	46	36	+91
West Bromwich		M.	76·2	38	4	35	30	+ 6	4	45	30	+23
Shide	E.	M.S.	76·4	40		—		...	4	44	48	−22
Guildford		M.	76·9	39	4	35	10	−18	4	45	13	− 3
Honolulu	E.	M.	77·0	290	4	35	0	−29	4	45	18	+ 1
Aachen		W.	81·1	40	4	35	57	+ 3	4	46	8	+ 4
Moncalieri		S.	82·4	45	4	35	59	− 1	4	45	26	−52
									4	45	29	−49
Heidelberg		—	82·6	41	4	36	3	+ 1	4	46	27	+ 6
Hamburg		—	82·8	37	4	36	4	+ 1	4	46	29	+ 6
							10	+ 7		—		...
Florence		A.	85·0	46	4	35	14	−62	4	46	5	−42
Padova		V.	85·3	45	4	36	21	+ 3	4	46	40	−10
Triest		W.	86·5	44	4	36	24	0	4	46	47	−17
Laibach		G.	87·0	44	4	36	28	+ 1	4	47	0	− 9
Graz		W.	87·5	43	4	36	27	− 3	4	46	54	−21
Pompeii		O.A.	87·7	49	4	36	32	+ 1		—		...
							33	+ 2		—		...
Zagreb		W.	87·8	44	4	36	28	− 4	4	46	58	−20
							34	+ 2		47	9	− 9
Vienna		W.	88·0	42	4	36	30	− 3	4	47	0	−20
Königsberg		W.	89·3	35		—		...	4	47	0	−34
Pulkovo		G.	93·0	28	4	36	55	− 5	4	48	0	−13
Czernowitz	N.	Ma.	94·2	40	4	40	21	+194	4	47	25	−61
Cape Town	E.	M.	100·4	123	4	47	12	? S.	? 4	47	12	−136
Makeyevka		G.	101·7	38	4	37	1	−46	4	48	50	−50
Helwan	E.	M.	103·6	57	4	44	0	+364	4	49	12	−45
	N.	M.	103·6	57	4	48	0	+604	4	50	30	+33
Tiflis		G.	108·9	41	4	42	36	+255		—		...
Irkutsk		G.	120·1	358	4	43	45	+274	4	51	41	−37
Tashkent		G.	123·2	28	4	44	25	+299	? 4	53	1	+20
Riverview		—	126·9	233		—		...	4	54	30	+83
Simla		O.E.	135·1	29	4	54	0	? S.	? 4	54	0	− 2
Mauritius	E.	M.	136·5	111	4	52	54	? S.	? 4	52	54	−77
Manila		W.	150·3	318	4	43	30	+129		—		...
Batavia		W.	174·1	258	4	45	0	+138		—		...

1913. October 11d. 1h. 34m. 4s.

Adopted Origin: 8°·5s. 147°·5E.; Irkutsk, 6°·0s. 147°·7E.; Tashkent, 6°·4s. 146°·2E.; Pulkovo, 6°·2s. 150°·5E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O—C. S.	S. H.	S. M.	S. S.	O—C. S.
Riverview	—	25·5	173	1	40	6	+19	1	44	36	+19
										46	+29
Sydney E.	M.	25·6	173	1	43	6	? S.	? 1	43	6	−72
Adelaide E.	M.	27·7	196	1	40	12	+ 3		—		...
Manila	W.	35·0	311	1	42	0	+43		—		...
Batavia	W.	40·5	273	1	42	43	+40	1	49	16	+58
Osaka	O.	44·7	346	1	42	41	+ 6	1	48	50	−25
Zi-ka-wei	W.	46·9	329	1	42	32	−18	1	49	20	−24
										24	−20
	O.	46·9	329	1	42	44	− 6	1	49	37	− 7
Cocos E.	M.	49·9	261	1	40	30	−160		—		...
Tsingtau	W.	51·4	332	1	43	12	− 8	1	50	30	−10
Honolulu E.	M.	61·2	60	1	44	12	−12	1	52	12	−30
Colombo E.	M.	69·2	281	1	56	0	? S.	? 1	56	0	+100
Irkutsk	G.	71·1	334	1	45	30	+ 2	1	54	33	−10
Kodaikanal E.	M.	72·2	284	1	45	54	+19		—		...
Simla	O.E.	77·9	304	1	46	0	−10		—		...
Bombay E.	M.	78·5	291	1	56	6	? S.	? 1	56	6	− 4
Mauritius E.	M.	86·7	250	1	56	12	? S.	? 1	56	12	−90
Tashkent	G.	86·9	313	1	46	59	− 3	? 1	57	15	−29
										29	−15
Ekaterinberg	G.	95·4	327	1	47	31	−18	1	58	6	−68
Victoria E.	M.	95·8	42	1	57	0	? S.	? 1	57	0	−138
Tiflis	G.	105·1	311	1	48	17	−23	2	0	55	+ 8
Makeyevka	G.	109·4	318	1	48	50	− 9	2	1	25	− 2
Pulkovo	G.	110·8	331	1	48	46	−19	2	1	16	−23
Helwan E.	M.	116·7	299	1	54	0	+268	2	3	48	+80
N.	M.	116·7	299	1	54	0	+268	2	10	42	+494
Czernowitz	Ma.	117·1	320	2	1	0	? S.	? 2	1	0	−91
Königsberg	W.	117·6	329	1	55	35	+359	? 2	4	0	+85
St. Louis	W.	120·5	50	? 2	3	16	? S.	? 2	3	16	+19
Budapest E.	W.	121·7	321	2	0	16	+621		—		...
N.	W.	121·7	321	1	57	46	+471		—		...
Vienna	W.	122·9	329	1	53	30	+209		—		...
Hamburg	—	123·6	331	1	55	20	+317	2	4	44	+84
Graz	W.	124·1	322	1	55	37	+331	2	4	38	+74
Zagreb	W.	124·5	321	2	10	0	+1192		—		...
Laibach	G.	125·1	322	1	54	16	+246	2	3	59	+28
Toronto E.	M.	126·2	41	2	5	24	? S.	? 2	5	24	+106
Heidelberg	—	126·8	328	1	54	0	+223		—		...
Aachen	W.	127·1	330	1	55	12	+294	2	5	6	+81
Ottawa	B.	127·7	37	2	2	8	? S.	? 2	2	8	−101
Florence	A.	128·2	321	2	2	23	? S.	? 2	2	23	−89
Stonyhurst E.	M.	128·7	338	2	5	0	? S.	? 2	5	0	+64
Bidston E.	M.	129·2	338	1	53	42	+194		—		...
West Bromwich	M.	129·5	336	1	57	0	+390	2	2	30	−92
Eskdalemuir	G.	129·5	339	? 1	53	26	+176	? 2	5	28	+86
Moncalieri	S.	129·7	324	1	51	30	+59	2	4	37	+34
						31	+60		—		...
Guildford	M.	129·9	334	1	52	0	+88	2	5	0	+56
Pilar E.	M.	130·0	145	1	57	6	+394		—		...
Shide E.	M.	130·6	334	1	49	30	−64	2	2	6	−123
Harvard University	B.O.	132·1	38		—		...	2	8	13	+234
La Paz	—	136·8	125	1	53	55	+174		—		...
San Fernando E.	M.	143·3	323	1	55	0	+212		—		...
N.	M.	143·3	323	1	57	30	+362		—		...

1913. October 11d 4h. 6m. 3s.

Adopted Origin: 7°·0s. 148°·0E.; Riverview, 9°·0s. 155°·0E.; Irkutsk, 6°·0s. 148°·5E.; Pulkovo, 6°·7s. 150°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Riverview		—	27·0	174	4	12	2	+ 1	4	16	36	− 8
Sydney	E.	M.	27·0	174	4	16	36	? S.	? 4	16	36	− 8
Manila		W.	34·4	309	4	13	48	+37		—		...
Batavia		W.	40·9	269	4	14	8	+ 3	4	20	21	− 2
Taihoku		—	41·1	322	4	14	26	+19		—		...
Osaka		O.	43·4	345	4	14	9	−15	4	18	3	−174
Zi-ka-wei		W.	45·9	328	4	14	32	−10	4	21	12	−18
		O.	45·9	328	4	14	35	− 7	4	21	26	− 4
Tsingtau		W.	50·3	331	4	15	12	0	4	22	30	+ 4
Cocos	E.	M.	50·6	260	4	12	0	−194		—		...
Honolulu	E.	M.	60·1	60	? 4	16	30	+14	4	16	30	−477
Calcutta	E.	M.	65·4	299	4	12	30	−260		—		...
Irkutsk		G.	70·0	333	4	17	21	+ 1	4	26	26	− 3
Kodaikanal	E.	M.	72·4	283	4	18	12	+37	? 4	27	24	+26
Simla		O.E.	77·5	304	4	18	0	− 7		—		...
Bombay	E.	M.	78·5	291	4	4	24	−829		—		...
Tashkent		G.	86·3	312	4	18	56	− 2	4	29	11	−25
Mauritius	N.	M.	87·7	250	4	29	0	? S.	? 4	29	0	−52
Ekaterinburg		G.	94·4	327	4	23	14	+211	4	29	57	−126
Victoria	E.	M.	94·4	42	4	14	18	−325		—		...
Tiflis		G.	104·5	311	4	20	16	−19	? 4	33	45	+64
Makeyevka		G.	108·6	318	4	20	29	−25	4	32	54	−24
Pulkovo		G.	109·8	332	4	20	39	−20	4	33	10	−19
Czernowitz		Ma.	116·2	321		—		...	4	35	40	+77
Königsberg	N.	W.	116·6	329	4	25	59	+269	4	35	31	+64
	E.	W.	116·6	329	4	26	4	+274	4	35	31	+64
Lemberg		B.O.	117·0	323	4	12	50	−522		—		...
Budapest	E.	W.	120·7	322	4	27	17	+328		—		...
	N.	W.	120·7	322	4	26	56	+307		—		...
Vienna		W.	122·0	324	4	25	12	+197	4	36	24	+77
Hamburg		—	122·5	332	4	26	42	+284	4	36	35	+84
Graz		W.	123·1	323		—		...	4	36	34	+78
Zagreb		W.	123·6	322	4	25	31	+209	4	36	0	+41
											39	+80
Laibach		G.	124·2	323	4	26	52	+287	4	36	47	+84
Toronto	E.	M.	124·8	40	? 4	37	54	+946		—		...
Heidelberg		—	125·8	329	4	27	11	+299	4	36	53	+78
Aachen		W.	126·0	331	4	27	9	+296	? 4	37	9	+93
Padova		V.	126·1	323	4	21	0	−73		—		...
Ottawa	E.	B.	126·1	37	? 4	27	0	+287	4	39	18	+221
	N.	B.	126·1	37	4	27	19	+306		—		...
Eskdalemuir		G.	126·5	340		—		...	4	26	55	? P.R.
Florence		A.	127·3	322	4	26	53	+275	4	35	0	−45
Pompeii	N.	O.A.	127·6	316	4	18	0	−259		—		...
Bidston	E.	M.	128·0	340	4	28	18	+357		—		...
West Bromwich	E.	M.	128·3	337	4	25	24	+181	4	37	42	+110
Guildford		M.	128·7	335	4	22	24	− 1	4	36	18	+23
Moncalieri		S.	128·8	325	4	24	40	+135	4	36	33	+37
Shide	E.	M.	129·4	335		—		...	4	28	30	−450
Harvard University		B.O.	130·6	38	4	27	30	+297	? 4	39	32	+204
Pilar	E.	M.	130·8	145	4	24	48	+374		—		...
La Paz		—	137·2	124	4	25	48	+166	? 4	41	40	+290
Granada		Bif.	140·3	324	4	27	19	+244	4	37	38	+29
San Fernando	E.	M.	142·3	325	4	27	0	+217		—		...
	N.	M.	142·3	325	4	25	30	+127		—		...

1913. October 11d. 9h. 9m. 43s.

Adopted Origin: 38°·5N. 145°·0E.;

Irkutsk, 38°·2N. 143°·7E.; Ekaterinburg, 40°·7N. 145°·4E. Tashkent, 40°·4N. 144°·0E.: Pulkovo, 39°·7N. 143°·9E.; Eskdalemuir, 44°·0N. 159°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Mizusawa		—	3·1	282	9	10	27	− 5		—		...
Osaka		O.	8·5	248	9	11	53	+ 1		—		...
Tsingtau		W.	19·7	271	9	14	10	−10	9	17	34	−26
Zi-ka-wei		W.	20·6	257	9	14	24	− 7	9	18	7	−12
		O.	20·6	257	9	14	29	− 2	9	18	21	+ 2
Irkutsk		G.	31·2	310	9	15	59	−24	9	21	9	−28
Manila		W.	31·9	228	9	16	42	+13	9	23	24	+95
Calcutta	E.	M.	50·5	269	9	3	57	−896	9	8	43	−1045
Simla		O.E.	54·9	284	9	19	6	−15	9	26	42	−21
Ekaterinburg		G.	55·7	319	9	19	18	− 9	9	26	56	−17
Tashkent		G.	56·2	299	9	16	26	−184	9	27	6	−13
Batavia		W.	57·0	227	9	19	43	+ 8	9	27	34	+ 5
Victoria	E.	M.	63·3	48	9	28	0	? S.	? 9	28	0	−48
Bombay	E.	M.	64·7	275	9	27	18	? S.	? 9	27	18	−106
Cocos	E.	M.	67·7	232	9	26	30	+345		—		...
Pulkovo		G.	68·1	330	9	20	46	− 2	9	29	36	−10
Makeyevka		G.	71·9	318	9	20	52	−20	9	29	53	−39
Tiflis		G.	71·9	309	9	21	8	− 4	9	30	24	− 8
Königsberg		W.	75·3	333	9	21	33	− 1	9	30	59	−13
Czernowitz	E.	Ma.	77·8	323	9	21	42	− 7	9	31	28	−13
Lemberg	N.	B.O.	77·9	325	9	4	34	−1035	9	14	58	+1004
		B.O.	77·9	325	9	6	38	−911	9	16	28	−914
Hamburg		—	80·1	335	9	22	0	− 3	9	31	54	−13
Budapest		W.	81·5	326		—			9	32	12	−12
Edinburgh	E.	M.	81·8	343	9	22	24	+12		—		...
Vienna		W.	82·0	328	9	22	7	− 6	9	32	17	−12
							10	− 3		—		...
Eskdalemuir		G.	82·3	342	9	22	15	0	9	32	17	−15
Ksara	E.	Ma.	82·3	308	9	22	19	+ 4	9	33	24	+52
	N.	Ma.	82·3	308	9	22	25	+10	9	33	27	+55
Graz		W.	83·3	328	9	22	21	0	9	32	30	−13
Aachen		W.	83·7	335	9	22	20	− 3	9	32	31	−17
											36	−12
Bidston	E.	M.	84·0	341	9	23	0	+35	9	32	42	− 9
Heidelberg		—	84·1	333	9	23	3	+37	9	31	33	−79
Zagreb		W.	84·2	327	9	22	12	−14	9	32	24	−29
							20	− 6			33	−20
West Bromwich		M.	84·3	340	9	22	18	− 9	9	33	0	+ 6
Sarajevo		W.	84·5	324	9	21	21	−67	9	32	39	−18
Laibach		G.	84·6	328	9	22	20	− 9	9	32	29	−29
Innsbruck		Ma.	84·8	330	9	24	24	+114	? 9	36	22	+202
Haslemere	E.	M.	85·0	339	9	33	45	? S.	? 9	33	45	+43
Guildford		M.	85·3	339	9	23	6	+33	9	32	15	−50
Shide	N.	M.	86·0	339	9	20	6	−150	9	31	30	−103
Padova		V.	86·1	329	9	22	35	− 2	9	32	56	−18
Cork	E.	M.	86·7	344	9	53	0	+1820		—		...
Florence		A.	87·7	329	9	22	53	+ 7	9	33	13	−19
Helwan	E.	M.	87·8	307	? 9	16	0	−407	9	31	42	−111
	N.	M.	87·8	307	9	21	30	−77	9	31	48	−105
Moncalieri		S.	88·1	331	9	22	39	−10	9	33	1	−35
Ottawa	N.	B.	88·5	27	? 9	22	41	−10	9	33	28	−13
Toronto	E.	M.	88·6	30	9	28	0	+309		—		...
Pompeii	E.	O.A.	88·8	325	9	21	0	−112	9	34	0	+16
	N.	O.A.	88·8	325	9	22	0	−52	9	33	0	−44
Harvard University		B.O.	92·7	26		—		...	9	33	34	−51
Granada		Bif.	99·0	335	9	23	42	− 6		—		...
Rio Tinto	E.	M.	99·3	338	10	0	0	+2170		—		...
San Fernando	E.	M.	100·4	337	9	34	30	? S.	? 9	34	30	−73
	N.	M.	100·4	337	9	34	0	? S.	? 9	34	0	−103
La Paz		—	143·6	62	9	29	52	+164		—		...

1913. October 12d. 17h. 3m. 29s.

Adopted Origin: 38°·0N. 145°·0E.; Irkutsk, 42°·9N. 148°·4E.; Ekaterinburg, 43°·5N. 149°·4E.; Tashkent, 39°·2N. 143°·8E.; Pulkovo, 39°0N. 142°8E.; Tiflis, 45°·9N. 149°·5E.; Eskdale, 43°·0N. 156°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. s.	S. H.	M.	S.	O−C. s.
Mizusawa		—	3·2	289	17	4	17	− 4		—		...
Osaka		O.	8·4	250	17	5	50	+14		—		...
Zi-ka-wei		W.	20·5	258	17	8	18	+ 2	17	12	10	+ 7
		O.	20·5	258	17	8	21	+ 5	17	12	14	+11
Irkutsk		G.	31·5	310	17	9	54	−18	17	15	6	−23
Ekaterinburg		G.	56·1	319	17	13	10	− 6	17	20	47	−17
Tashkent		G.	56·9	300	17	13	18	− 2	17	21	1	−13
Pulkovo		G.	68·6	331	17	14	41	+ 4	17	23	32	− 6
Tiflis		G.	72·2	309	17	15	2	+ 2	17	24	15	− 6
Makeyevka		G.	72·4	318	17	14	39	−22	17	23	26	−58
							37	−24			22	−62
Königsberg		W.	75·8	331	17	15	12	−11	17	24	55	− 9
Czernowitz		Ma.	78·2	324	17	15	37	0	? 17	25	18	−13
Lemberg		B.O.	78·3	325	17	18	24	+166		—		..
Hamburg		—	80·6	335	17	15	39	−13	17	25	49	−10
Budapest		W.	81·9	326	17	15	51	− 8	17	26	6	− 8
Edinburgh	E.	M.	82·3	343	17	26	30	? S.	? 17	26	30	+12
Vienna		W.	82·4	328	17	16	1±	0	? 17	26	12	− 7
Bidston	E.	M.	82·8	341	17	26	54	? S.	? 17	26	54	+30
Eskdalemuir		G.	82·8	342	17	16	6	+ 2	17	26	14	−10
Graz		W.	83·7	328	17	16	9	0	17	26	21	−13
Stonyhurst	E.	M.	84·0	341	17	27	24	? S.	? 17	27	24	+47
Aachen		W.	84·2	335	17	16	13	+ 1	17	26	43	+ 4
Zagreb		W.	84·7	327	17	16	12	− 3	17	26	24	−21
Laibach		G.	85·0	328	17	16	17	0	17	26	30	−18
Sarajevo	N.	W.	85·0	324	17	16	22	+ 5	17	26	34	−14
West Bromwich		M.	85·1	341	17	19	0	+162	17	27	0	+11
Innsbruck		Ma.	85·2	330	17	16	18	0		—		...
Guildford		M.	85·8	339	17	15	22	−59	17	27	42	+45
						18	42	+141		—		...
Shide		M.S.	86·5	339		—		...	17	26	12	−53
Padova		V.	86·6	329	17	16	18	− 8	17	26	50	−16
Helwan		M.	88·1	307	17	26	0	? S.	? 17	26	0	−82
Florence		A.	88·2	329		—		...	17	26	54	−29
Moncalieri		S.	88·6	331	17	23	3	+386	17	32	31	+303
Pompeii	E.	O.A.	89·2	325	17	17	0	+20		—		...
	N.	O.A.	89·2	325	17	16	0	−40		—		...
Rio Tinto	E.	M.	99·9	338	17	59	0	+2481		—		...
San Fernando	N.	M.	100·9	337	17	55	0	+2236		—		...

1913. October 23d. 15h. 0m. 32s.

Adopted Origin: 8°·0N. 81°·5W.

Station and Component.		Machine.	Distance from Origin. °	° Azimuth.	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Lima	E.	M.	20·5	168	15	4	40	−39		—		...
La Paz		—	27·8	152	15	6	38	0	15	11	26	− 1
St. Louis		W.	31·6	347	? 15	8	26	+71	15	13	14	+41
Harvard University		B.O.	35·6	13		—		...	15	13	22	−14
Ottawa	N.	B.	37·7	7	15	7	58	−10	15	13	52	−14
Pilar	E.	M.	43·1	158	15	14	12	? S.	? 15	14	12	−69
Granada		—	75·5	54	15	11	32	−52	15	21	10	−54
Eskdalemuir		G.	76·7	35		—		...	15	22	19	+ 2
Edinburgh	E.	M.	76·8	34	15	23	12	? S.	? 15	23	12	+53
West Bromwich		M.	77·3	38		—		...	15	18	30	−234
Guildford		M.	78·1	39	15	12	18	−22	15	21	40	−53
Aachen		W.	82·3	40		—		...	15	23	0	−21
Hamburg		—	84·4	37		—		...	15	23	0	−44
Florence		A.	86·4	46	15	24	37	? S.	? 15	24	37	+31
Triest		W.	87·9	44		—		...	15	24	13	−10
Graz		W.	88·8	43	15	13	46	+ 5	15	23	21	−72
Vienna		W.	89·2	41	15	13	46	+ 3		—		...
Pulkovo		G.	93·7	28	15	13	30	−38	15	24	42	−43
Lemberg		B.O.	93·8	39	? 15	14	30	+21		—		...
Makeyevka		G.	102·9	37	15	15	7	+10		—		...
Helwan	E.	M.	105·3	56	15	28	0	? S.	? 15	28	0	+43
Ekaterinburg		G.	108·1	21	15	19	37	+256		—		...

1913. October 29d. 4h. 31m. 53s.

Adopted Origin: 1°·0s. 99°·0E.; Tashkent, 1°·0N. 92°·4E.; Irkutsk, 0°·0N. or S. 104°·0E.; Tiflis, 0°·6N. 98°·0E. or 36°·4N. 39°·5W.; Ekaterinburg, 1°·3N. 101°·3E.; Pulkovo, 6°·0S. 84°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Batavia		W.	9·3	123	4	34	57	+44	4	37	2	+58
Cocos	E.	M.	11·3	191	4	36	0	? S.	? 4	36	0	−55
Colombo	E.	M.	20·7	293	4	37	36	+54	4	40	36	+ 5
Calcutta	E.	M.	25·7	337	4	0	39	-2219	? 4	41	19	−50
Manila		W.	26·8	54	4	37	30	−19		—		...
Bombay	E.	M.	32·5	309	4	44	6	? S.	? 4	44	6	− 3
Zi-ka-wei		W.	38·6	32	4	39	28	− 8	4	45	26	- 13
		O.	38·6	32	4	40	23	+47		—		...
Tsingtau		W.	42·1	26	4	39	56	− 9	? 4	46	20	− 9
Seychelles	E.	M.	43·9	266	4	54	0	+822		—		...
Mauritius	E.	M.	44·4	242	4	45	30	? S.	? 4	45	30	−90
	N.	M.	44·4	242	4	49	0	? S.	? 4	49	0	+120
Osaka		O.	49·4	40	4	40	47	− 9	4	51	11	+187
Adelaide	E.	M.	50·1	137	4	48	36	+455	? 4	48	36	+23
Tashkent		G.	50·2	331	4	40	54	− 7	4	47	49	−25
		—	50·2	331		—		...	4	48	9	− 5
Irkutsk		G.	53·5	4	4	41	20	− 3	4	48	45	−11
Sydney	E.	M.	58·7	130	4	50	42	? S.	? 4	50	42	+42
Riverview		—	58·7	130	4	50	34	? S.	? 4	50	34	+34
Tiflis		G.	64·8	318	4	42	36	− 1	4	51	5	−11
Ekaterinburg		G.	65·5	338		—		...	4	51	11	−13
Helwan	E.	M.	71·2	302	4	51	0	+463	4	57	6	+273
	N.	M.	71·2	302	4	52	0	? S.	? 4	52	0	−33
Makeyevka		G.	71·9	322	4	43	1	−21	4	52	18	−24
Czernowitz		Ma.	79·6	320	4	43	0	−70	4	53	54	−18
											56	−16
Pulkovo		G.	80·3	332	4	44	8	− 6	4	54	3	−17
Lemberg		B.O.	80·9	320	4	54	48	? S.	? 4	54	48	+21
Königsberg		W.	84·2	325	4	44	52	+16	4	54	43	−20
Vienna		W.	85·8	318	4	44	41	− 4	4	55	6	−15
Graz		W.	86·3	317	4	44	55	+ 7	4	55	7	−19
Triest		W.	87·4	316		—		...	4	55	15	−23
Padova		V.	88·6	315	4	44	30	−31	4	54	34	−78
Hamburg		—	90·2	324	4	45	5	− 5	4	55	46	−23
Moncalieri		S.	91·6	315	? 4	42	33	−165	4	55	19	−65
Aachen		W.	92·6	321		—		...	4	56	4	−30
Guildford		M.	96·7	322	? 4	47	24	+98	4	56	21	−55
Shide	E.	M.	97·2	321	4	45	30	−18	4	56	24	−57
West Bromwich		M.	97·5	323	4	44	0	−110		—		...
Edinburgh	E.	M.	97·6	326	4	58	6	? S.	? 4	58	6	+41
Eskdalemuir		G.	97·7	326		—		...	4	56	55	−31
Bidston	E.	M.	98·0	324	4	51	42	+349		—		...

1913. November 10d. 21h. 12m. 10s.

Adopted Origin: 18°·0s. 170°·0E.; Riverview, 18°·0s. 170°·0E.; Irkutsk, 10°·9s. 169°·2E.; Pulkovo, 14°·0s. 165°·0E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. s.	S. H.	S. M.	S. S.	O−C. s.
Riverview		—	23·1	223	21	17	28	0	21	21	37	0
Adelaide	E.	M.	32·7	232	21	18	48	−15		—		...
Honolulu	E.	M.	50·3	40	21	21	48	+29	21	29	12	+39
Manila		W.	58·3	301	21	22	6	− 5		—		...
Osaka		O.	62·1	328	21	22	46	+10	21	30	48	−11
Batavia		W.	62·6	271	21	22	44	+ 5	21	30	55	−11
Zi-ka-wei		W.	67·8	316	21	23	12	0	21	31	48	−22
		O.	67·8	316	21	23	31	+19		—		...
Cocos	E.	M.	70·4	263	21	23	0	−29	21	32	0	−41
Victoria	E.	M.	88·9	38	21	35	30	? S.	21	35	30	−42
Calcutta	E.	M.	89·5	294	21	23	57	−86	21	34	37	−102
Irkutsk		G.	90·3	326	21	25	21	− 7	21	35	47	−40
Simla		O.E.	101·6	299	21	30	18	+230		—		...
Mauritius	E.	M.	103·3	243	21	28	48	+131		—		...
	N.	M.	103·3	243	21	37	0	? S.	21	37	0	−97
Pilar	E.	M.	108·4	134	21	42	30	? S.	21	42	30	+186
Tashkent		G.	109·7	308	21	26	45	−21	21	46	21	+406
		G.	109·7	308	21	31	15	+249	21	40	46	+71
La Paz		—	113·9	117	21	31	20	+234	21	42	7	+116
Ekaterinberg		G.	115·6	325	21	27	12	−21	21	41	33	+68
Toronto	E.	M.	117·1	50	? 21	37	54	? S.	21	37	54	−163
Ottawa		B.	119·6	47	? 21	50	0	+1330		—		...
Tiflis		G.	128·0	309	21	31	31	+183		—		...
Pulkovo		G.	129·2	335	21	28	14	−20	21	41	46	−19
Makeyevka		G.	130·9	319	21	28	8	−34	21	41	21	−55
Ksara	E.	Ma.	136·2	300	21	31	48	+163	21	34	24	−507
	E.	Ma.	136·2	300	21	46	0	? S.	21	46	0	+189
Königsberg		W.	136·5	335		—		...		—		...
Beirut	E.	M.	136·6	300	? 21	34	0	+294		—		...
Czernowitz		Ma.	138·0	324		—		...		—		...
Lemberg		B.O.	138·4	327	21	30	20	+65	21	42	14	−50
Breslau		W.	140·6	333	21	31	46	+143		—		...
Helwan	E.	M.	140·6	296	21	32	0	+157	21	36	0	−437
	N.	M.	140·6	296	21	34	0	+277		—		...
Hamburg		—	141·2	341	21	31	52	+146		—		...
Edinburgh	E.	M.	141·7	354	21	35	30	+362		—		...
Budapest		W.	142·1	328	21	31	56	+147		—		...
Eskdalemuir		G.	142·3	354	21	31	58	+148		—		...
Vienna		W.	142·9	331	21	31	53	+140	? 21	43	0	−30
						32	1	+148		—		...
Stonyhurst	E.	M.	143·7	353	21	31	36	+120		—		...
Bidston	E.	M.	144·2	353	21	32	24	+166	21	38	36	−301
Graz		W.	144·2	330	21	31	58	+140	21	42	25	−72
		W.	144·2	330	21	35	27	+349	21	47	18	+221
Aachen		W.	144·8	342	21	31	55	+135		—		...
West Bromwich		M.	144·9	352	21	32	0	+139	21	44	0	+19
Zagreb		W.	145·0	328	21	32	0	+139	21	34	26	−556
							4	+143		—		...
Heidelberg		—	145·3	339	21	31	54	+132		—		...
Laibach		G.	145·4	330	21	32	6	+143		—		...
Innsbruck		Ma.	145·9	334	21	32	1	+136		—		...
Guildford		M.	145·9	349	21	33	15	+210	21	47	36	+229
Triest		W.	146·0	330	21	32	2	+137		—		...
Shide	E.	M.	146·5	350	21	32	30	+163	21	47	12	+202
Padova		V.	147·1	331	21	32	7	+138		—		...
Monte Cassino		Ca.	148·9	324	21	32	15	+138		—		...
Pompeii		O.A.	149·1	322	21	32	14	+137		—		...
Moncalieri		S.	149·2	335	21	31	58	−120	21	43	35	−28
Azores	E.	M.	155·9	32	22	33	18	+3774		—		...
Granada		Bif.	160·0	345	21	32	35	+117		—		...
San Fernando		M.	161·2	350	21	32	30	+108		—		...

1913. November 19d. 3h. 20m. 7s.

Adopted Origin: 2°·0s. 122°·0E.; Tashkent, 1°·7N. 127°·3E.; Ekaterinburg, 2°·9s. 120°·6E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Batavia		W.	15·7	255	3	23	57	+ 2	3	27	18	+23
Manila		W.	16·6	357	3	24	24	+17	3	27	24	+ 8
Perth	E.	M.	30·5	190	3	29	30	+170		—		...
Zi-ka-wei		W.	33·2	359	3	27	1	− 4	3	32	21	−13
		O.	33·2	359		—		...	3	32	16	−18
Adelaide	E.	M.	36·3	157	3	19	6	−505	3	32	54	−27
Osaka		O.	38·8	18	3	27	55	+ 4	3	33	45	−10
Sydney	E.	M.	41·9	143	3	27	36	−41	3	34	6	−35
Riverview		—	41·9	143	3	28	6	−11	3	34	17	−24
							9	− 8		—		...
Colombo	E.	M.	43·1	283	3	28	42	+16		—		...
Kodaikanal	E.	M.	46·1	287	3	29	12	+24		—		...
Bombay	E.	M.	52·6	296	3	30	18	+47		—		...
Simla		O.E.	54·0	312	3	30	0	+20	3	37	30	+205
Irkutsk		G.	56·3	247	3	30	6	+11	3	37	56	+11
Tashkent		G.	64·5	318	3	30	59	+12	3	39	41	+15
Mauritius	N.	M.	65·1	249	3	32	30	+97		—		...
Ekaterinburg		G.	76·5	330	3	33	16	+71	3	42	59	+69
Honolulu	E.	M.	81·4	68	3	33	18	+44	3	42	36	−10
Beirut		M.	88·3	304	3	41	30	+497		—		...
Helwan	E.	M.	91·5	300	3	34	0	+29	3	45	18	+42
	N.	M.	91·5	300	3	36	0	+149	3	45	30	+54
Pulkovo		G.	91·7	330	? 3	34	35	+63	? 3	44	9	−29
Czernowitz		Ma.	95·5	318		—		...	3	44	0	−78
Lemberg		B.O.	96·7	319	3	37	36	+222	? 3	46	54	+84
Vienna		W.	101·9	322	? 3	39	18	+292	? 3	45	6	−75
Zagreb		W.	102·8	317	3	38	54	+263	3	44	54	−95
Triest		W.	104·1	317		—		...	3	46	1	−40
Hamburg		—	104·5	325	3	37	0	+141		—		...
Heidelberg		—	106·7	321	3	36	45	+116		—		...
Victoria	E.	M.	107·6	39	3	51	0	+967		—		...
Aachen		W.	107·7	323	3	39	0	+242	? 3	45	30	−104
Moncalieri		S.	108·4	317	? 3	39	26	+269	3	53	28	+367
Edinburgh	E.	M.	110·6	331	3	42	0	+413		—		...
Eskdalemuir		G.	110·9	330		—		...	? 3	45	41	−122
Stonyhurst	E.	M.	111·2	326	3	46	0	? S.	? 3	46	0	−106
Bidston	E.	M.	111·7	328	3	46	30	? S.	? 3	46	30	−80
Shide	E.	M.	112·0	325	? 3	39	30	+256	? 3	49	0	+67
Granada		Bif.	119·0	312	3	39	52	+247	3	50	18	+89
San Fernando	E.	M.	121·2	312	3	52	30	? S.	? 3	52	30	+205
Ottawa	N.	B.	133·9	17	? 3	43	34	+403	? 3	54	14	+221
Toronto	E.	M.	134·2	22	3	55	36	? S.		—		...
Harvard University		B.O.	137·9	15	? 3	44	41	+452	? 4	0	18	+560
La Paz		—	158·9	152	3	40	30	+119	3	55	54	+195

1913. November 23d. 21h. 17m. 33s.

Adopted Origin: 49°·5N. 165°·5E.; Tiflis, 50°·5N. 157°·9E.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka	O.	26·5	248	21	23	24	− 2	21	28	12	+ 7
Zi-ka-wei	W.	37·5	258	21	24	56	−11	21	30	8	−56
Irkutsk	G.	37·6	299	21	24	44	−24	21	30	33	−32
Honolulu E.	M.	40·3	121	21	33	0	+450	21	37	6	+322
Victoria E.	M.	45·0	63		—		...		—		...
Ekaterinburg	G.	56·9	321	21	27	23	− 1	21	34	42	−36
Tashkent	G.	63·4	303	21	28	6	− 1	21	36	30	− 9
Pulkovo	G.	64·9	337	? 21	27	9	−68	21	36	35	−22
St. Louis	W.	69·7	54		—		...		—		...
Ottawa	B.	71·2	41		—		...		—		...
Edinburgh E.	M.	74·2	354	21	39	30	? S.	21	39	30	+41
Eskdalemuir	G.	74·7	354		—		...	? 21	38	43	−12
Hamburg	—	74·9	345	21	29	27	+ 6	21	39	0	+ 2
Tiflis	G.	75·1	318	21	29	18	− 5	21	38	32	−28
Batavia	W.	75·3	241		—		...	21	39	0	− 2
Harvard University	B.O.	75·6	40		—		...	21	38	36	−30
Lemberg	B.O.	75·8	335	21	40	36	? S.	21	40	36	+88
Stonyhurst	M.	76·2	353	21	39	6	? S.	21	39	6	− 6
Aachen	W.	78·2	347		—		...	21	39	42	+ 7
Shide E.	M.	79·2	352	? 21	36	30	+403		—		...
Zagreb	W.	81·1	339	21	30	8	+ 9	? 21	40	18	+ 9
Triest	W.	81·8	340		—		...		—		...
Moncalieri	S.	83·6	344	21	37	15	+422	21	50	13	+576
Helwan E.	M.	90·7	322	21	39	0	+487		—		...
Granada	—	92·8	351		—		...	? 21	42	23	+ 7

1913. November 23d. 21h. 17m. 33s.

Adopted Origin: 47°·5N. 163°·0E.; Ekaterinburg, 54°·6N. 170°·7E.; Tiflis, 50°·5N. 157°·9E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Osaka		O.	24·2	248	21	23	24	+21	21	28	12	+53
Zi-ka-wei		W.	35·5	258	21	24	56	+ 5	21	30	8	−28
Irkutsk		G.	37·1	300	21	24	44	−20	21	30	33	−25
Honolulu	E.	M.	40·8	116	21	33	0	+446	21	37	6	+315
Victoria	E.	M.	47·4	60		—		...	21	36	30	+191
Ekaterinburg		G.	57·4	321	21	27	23	− 5	21	34	42	−42
Tashkent		G.	63·0	303	21	28	6	+ 1	21	36	30	− 4
Pulkovo		G.	66·0	336	? 21	27	9	−75	21	36	35	−35
St. Louis		W.	72·2	52		—		...		—		...
Batavia		W.	72·8	240		—		...	21	39	0	+27
Ottawa		B.	73·8	39		—		...		—		...
Tiflis		G.	75·4	317	21	29	18	− 6	21	38	32	−31
Edinburgh	E.	M.	76·0	352	21	39	30	? S.	21	39	30	+20
Hamburg		—	76·3	344	21	29	27	− 3	21	39	0	−14
Eskdalemuir		G.	76·5	352		—		...	? 21	38	43	−33
Lemberg		B.O.	76·9	334	21	40	36	? S.	21	40	36	+75
Stonyhurst	E.	M.	78·0	351	21	39	6	? S.	21	39	6	−27
Harvard University		B.O.	78·2	38		—		...	21	38	36	−59
Aachen		W.	79·7	345		—		...	21	39	42	−11
Shide	E.	M.	80·8	350	? 21	36	30	? S.	21	36	30	−216
Zagreb		W.	82·4	338	21	30	8	+ 3	? 21	40	18	− 5
Triest		W.	83·0	339		—		...		—		...
Moncalieri		S.	85·0	343	21	37	15	−414	21	50	13	+561
Helwan	E.	M.	91·2	320	21	39	0	? S.	21	39	0	−179
Granada		Bif.	94·5	349		—		...	? 21	42	23	−13

1913. December 15d. 17h. 43m. 13s.

Adopted Origin: 24°·0N. 124°·5E.; Irkutsk, 24°·6N. 118°·1E.; Tashkent, 26°·7N. 124°·3E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Taihoku		—	2·9	290	17	44	1	+3		—		...
Zi-ka-wei		W.	7·7	340	17	45	16	+6		—		...
		O.	7·7	340	17	45	35	+25		—		...
Osaka		O.	14·3	39	17	48	3	+80		—		...
Irkutsk		G.	32·2	337	17	49	48	−14	17	54	52	−32
Calcutta	E.	M.	33·1	272	17	58	16	? S.	17	58	16	+157
Batavia		W.	34·8	212	17	50	17	−7	17	55	33	−32
Simla		M.	43·1	293	17	58	16	? S.	17	58	16	+14
Tashkent		G.	48·7	305	17	52	5	−6	17	59	0	−15
Ekaterinburg		G.	55·9	324	17	53	0	+2	18	0	36	−10
Riverview		—	63·2	155	18	19	30	+1544		—		...
Tiflis		G.	66·9	307	17	54	8	−2	18	2	58	−4
Honolulu	E.	M.	70·6	75	18	1	36	+422	18	11	36	+470
Pulkovo		G.	71·5	328	17	54	43	+3	18	3	50	−7
Königsberg		W.	78·2	325		—		...	18	5	42	+27
Budapest		W.	82·2	319	17	57	32	+108		—		...
Vienna		W.	83·4	320	17	55	38	−13		—		...
Hamburg		—	84·1	327	18	24	0	+1684		—		...
Zagreb		W.	85·0	318	17	56	0	−1	? 18	6	18	−14
Triest		W.	86·3	319		—		...	? 18	6	0	−46
Aachen		W.	87·7	326		—		...	18	7	0	−2
Stonyhurst	E.	M.	89·7	332	18	6	30	? S.	18	6	30	−54
Moncalieri		S.	90·2	321	18	7	26	? S.	18	7	26	−3
Bidston	E.	M.	90·3	332	18	24	0	+1648		—		...
West Bromwich		M.	90·4	331	18	27	30	+1859		—		...
Guildford		M.	90·6	329	17	57	45	+73	18	8	17	+44
Shide	E.	M.	91·3	329	17	57	0	+24	? 18	15	0	+440

1913. December 21d. 15h. 37m. 48s.

Origin : 24°·5N. 102°·0E. ; Irkutsk, 25°·0N. 102°·0E. (approximate) ; Ekaterinburg, 23°·9N. 99°·4E.

Station and Component.		Machine.	Distance from Origin. °	Azimuth. °	P. H.	M.	S.	O−C. S.	S. H.	M.	S.	O−C. S.
Calcutta	E.	M.	12·7	265	15	39	34	−83	? 15	44	8	+43
Zi-ka-wei		W.	18·4	64	15	42	6	− 4	15	45	40	+ 3
		O.	18·4	64	15	42	7	− 3	15	45	43	+ 6
Manila		W.	20·4	115	15	42	30	− 4	15	46	24	+ 5
Simla		O.E.	22·9	293	15	42	24	−40	15	46	42	−29
Kodaikanal	E.	M.	27·4	243	15	46	30	+160	? 15	48	18	−18
Colombo	E.	M.	27·6	234	15	46	0	+128		—		...
Bombay	E.	M.	27·7	263	15	49	18	? S.	15	49	18	+36
Irkutsk		G.	27·8	3	15	43	44	−10	15	48	28	−15
Osaka		O.	30·6	63	15	45	2	+40	15	49	49	+17
Batavia		W.	31·1	171	15	44	13	−14	15	55	45	+364
Tashkent		G.	31·9	310	15	44	24	−10	15	49	39	−15
Cocos	E.	M.	37·0	188	? 15	55	0	? S.	15	55	0	+228
Ekaterinberg		G.	43·8	328	15	44	4	−128	15	50	38	−129
							7	−125		—		...
Tiflis		G.	49·9	305	15	46	52	− 2	15	54	7	+ 1
Beirut	E.	M.	57·9	296	16	0	0	? S.	16	0	0	+254
Pulkovo		G.	59·9	326	15	48	5	+ 6	15	56	19	+ 9
Mauritius	E.	M.	61·9	228	16	3	30	? S.	16	3	30	+415
Helwan	E.	M.	62·1	292	15	55	0	? S.	15	55	0	−97
	N.	M.	62·1	292	15	56	30	? S.	15	56	30	− 7
Czernowitz		Ma.	62·9	313		—		...	15	56	30	−18
Lemberg		B.O.	64·0	315	15	56	6	? S.	15	56	6	−55
Königsberg		W.	65·4	321		—		...	16	2	12	+294
Breslau		W.	68·1	318	? 15	48	35	−18		—		...
Adelaide	E.	M.	68·8	148		—		...	16	7	12	+552
Vienna		W.	69·1	315	15	49	6	+ 6	16	5	54	+471
Graz		W.	70·0	314	15	49	11	+ 6	15	58	30	+16
Zagreb		W.	70·2	312	15	49	8	+ 2	15	58	10	− 6
							12	+ 6			21	+ 5
Triest		W.	71·6	313	15	58	39	? S.	15	58	39	+ 6
Hamburg		—	71·6	321		—		...	15	58	0	−33
Pompeii	E.	O.A.	72·5	307	15	52	2	+161		—		...
	N.	O.A.	72·5	307	15	48	2	−79		—		...
Innsbruck		Ma.	72·6	315	15	49	29	+ 7	15	58	50	+ 5
Padova		V.	72·9	313	15	49	31	+ 8	15	59	4	+15
Heidelberg		—	73·9	317	15	58	2	? S.	15	58	2	−59
Riverview		—	74·5	139	15	49	54	+20		—		...
Aachen		W.	74·8	319		—		...	15	58	18	−54
Moncalieri		S.	75·8	313	15	59	28	? S.	15	59	28	+ 5
Edinburgh	E.	M.	77·9	326	15	57	42	? S.	15	57	42	−125
Eskdalemuir		G.	78·1	326	15	59	55	? S.	15	59	55	+ 6
Stonyhurst	E.	M.	78·4	324	15	59	30	? S.	15	59	30	−23
Guildford		M.	78·5	321	15	52	20	+142	16	2	24	+150
West Bromwich		M.	78·7	323	16	0	0	? S.	16	0	0	+ 4
Bidston	E.	M.	78·9	324	16	0	12	? S.	16	0	12	+13
Shide	E.	M.	79·1	321	15	59	0	? S.	15	59	0	−61
Cork	E.	M.	82·5	324	15	56	0	+339		—		...
Granada		Bif.	86·8	310	15	49	21	−85	16	0	6	−81
Rio Tinto	E.	M.	88·5	312	16	2	0	? S.	16	2	0	+14
San Fernando	N.	M.	88·9	310	16	0	0	? S.	16	0	0	−110
Honolulu	E.	M.	89·5	67	16	2	42	? S.	16	2	42	+45
Ottawa		B.	110·0	358		—		...	? 16	16	10	+654
Toronto	E.	M.	111·8	1	16	12	42	? S.	16	12	42	+430

1913. December 25d. 6h. 48m. 30s.

Adopted Origin: 32°·5N. 31°·5W.; Eskdalemuir, 32°·0N. 27°·0W.; Pulkovo, 35°·N. 37°·0W.

Station and Component.	Machine.	Distance from Origin. °	Azimuth. °	P. H.	P. M.	P. S.	O−C. S.	S. H.	S. M.	S. S.	O−C. S.
Azores E.	M.	7·1	40	6	50	36	+18		—		...
San Fernando N.	M.	21·2	72	6	59	30	? S.	6	59	30	+132
Granada	Bif.	23·3	70	6	52	38	−72	6	54	57	−184
Bidston E.	M.	29·2	36	7	0	0	? S.	7	0	0	+10
West Bromwich	M.	29·2	38	6	55	6	+16	6	59	54	+ 4
Guildford	M.	29·3	43	6	55	50	+59	6	59	37	−15
Eskdalemuir	G.	30·2	32	6	55	1	+ 1	6	59	55	−12
Edinburgh	M.	30·6	31	7	0	12	? S.	7	0	12	− 2
Harvard University	B.O.	32·6	299	7	1	56	? S.	7	1	56	+68
Moncalieri	S.	32·7	56	6	56	33	+70	7	0	57	+ 8
Aachen	W.	33·0	45	6	55	26	0	7	0	49	− 5
Heidelberg	—	34·0	48	6	55	39	+ 4		—		...
Innsbruck	Ma.	35·5	53	6	55	53	+ 5	7	1	33	0
Padova	V.	35·7	56	6	56	1	+12		—		...
Hamburg	—	36·2	42	6	55	50	− 4		—		...
Ottawa	B.	36·2	304	6	58	54	? S.	6	58	54	−169
Triest	W.	37·0	56	6	56	5	+ 5	7	1	57	+ 3
Pompeii	O.A.	37·4	66	6	56	2	− 1		—		...
						12	+ 9		—		...
Graz	W.	38·2	52	6	56	13	+ 3	7	2	12	+ 1
Zagreb	W.	38·3	56	6	56	19	+ 9	7	2	12	0
Toronto E.	M.	38·7	301	? 7	1	0	? S.	7	1	0	−78
Vienna	W.	39·0	52	6	56	21	+ 5	? 7	2	24	+ 2
Breslau	W.	39·8	47	6	56	21	− 2	7	2	5	−29
Königsberg	W.	42·4	42	6	56	46	+ 2	7	3	14	+ 4
Lemberg	B.O.	44·1	51	6	57	0	+ 3		—		...
Pulkovo	G.	48·3	36	6	57	28	+ 2	7	4	31	+ 3
Tiflis	G.	59·6	57	6	59	1	+22	? 7	7	22	+34
Tashkent	G.	76·4	49	7	0	36	+ 9	7	10	30	+18
Irkutsk	G.	86·9	25	7	1	29	+ 1	7	12	3	− 7
Honolulu E.	M.	105·7	309	7	17	30	? S.	7	17	30	+131

TABLE.

Degrees.	P sec.	S sec.	S – P sec.	Degrees.	P sec.	S sec.	S – P sec.	Degrees.	P sec.	S sec.	S – P sec.
1	15	28	13	51	553	991	438	101	855	1565	710
2	31	55	24	52	560	1004	444	102	860	1575	715
3	47	83	36	53	566	1016	450	103	865	1584	719
4	62	110	48	54	573	1029	456	104	870	1593	723
5	77	137	60	55	579	1041	462	105	874	1602	728
6	92	164	72	56	586	1054	468	106	879	1612	733
7	106	190	84	57	592	1066	474	107	884	1621	737
8	121	217	96	58	599	1079	480	108	888	1630	742
9	136	243	107	59	605	1091	486	109	893	1639	746
10	150	269	119	60	612	1103	491	110	897	1648	751
11	164	294	130	61	619	1116	497	111	902	1657	755
12	179	319	140	62	625	1128	503	112	907	1666	759
13	193	344	151	63	632	1141	509	113	911	1674	763
14	206	368	162	64	638	1153	515	114	916	1682	766
15	219	392	173	65	645	1165	520	115	920	1690	770
16	232	415	183	66	651	1177	526	116	925	1698	773
17	245	438	193	67	658	1190	532	117	929	1706	777
18	257	460	203	68	664	1202	538	118	934	1714	780
19	269	482	213	69	671	1214	543	119	938	1722	784
20	281	503	222	70	677	1226	549	120	942	1729	787
21	293	524	231	71	683	1238	555	121	947	1737	790
22	305	545	240	72	690	1250	560	122	952	1744	792
23	317	565	248	73	696	1262	566	123	957	1752	795
24	328	584	256	74	702	1274	572	124	961	1759	798
25	338	603	265	75	709	1286	577	125	966	1766	800
26	348	622	274	76	715	1297	582	126	970	1773	803
27	358	641	283	77	721	1309	588	127	974	1780	806
28	368	659	291	78	727	1320	593	128	978	1787	809
29	378	677	299	79	733	1332	599	129	983	1794	811
30	388	694	306	80	739	1343	604	130	988	1801	813
31	398	711	313	81	745	1355	610	131	992	1807	815
32	407	728	321	82	750	1366	616	132	996	1814	818
33	416	744	328	83	756	1377	621	133	1001	1821	820
34	425	760	335	84	762	1388	626	134	1005	1827	822
35	433	775	342	85	768	1399	631	135	1009	1833	824
36	442	790	348	86	773	1410	637	136	1014	1840	826
37	450	804	354	87	779	1421	642	137	1018	1846	828
38	458	818	360	88	785	1432	647	138	1023	1852	829
39	466	832	366	89	790	1443	653	139	1027	1858	831
40	475	847	372	90	796	1454	658	140	1031	1864	833
41	483	861	378	91	801	1464	663	141	1035	1869	834
42	491	875	384	92	807	1475	668	142	1039	1875	836
43	498	888	390	93	812	1485	673	143	1043	1881	838
44	506	902	396	94	818	1496	678	144	1047	1886	839
45	513	915	402	95	823	1506	683	145	1051	1892	841
46	520	928	408	96	829	1516	687	146	1055	1897	842
47	527	941	414	97	834	1526	692	147	1059	1902	843
48	534	954	420	98	840	1536	696	148	1063	1907	844
49	540	966	426	99	845	1546	701	149	1067	1912	845
50	547	979	432	100	851	1556	705	150	1071	1917	846

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